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NATIONAL HERBARIUM MELBOURNE

The Journal of the Department of Agriculture of Victoria, Australia.

April, 1926.

PRINCIPAL CONTENTS

Poultry Feeding Experiments

Crop Competitions

Swan Hill Lucerne Competition

Plum and Prune Culture

The Cull Cow

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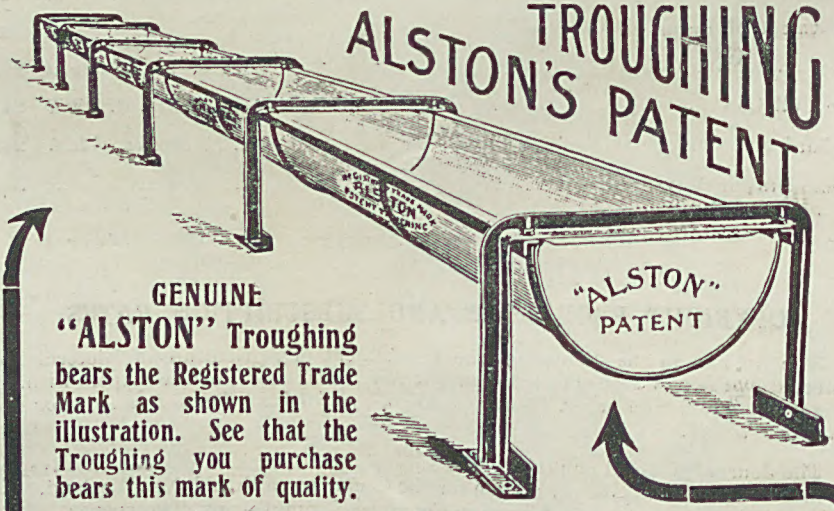

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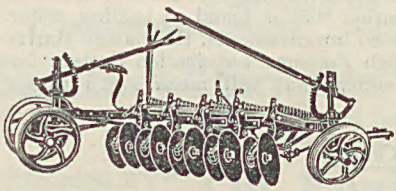

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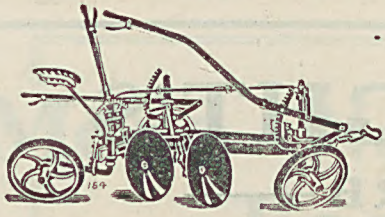

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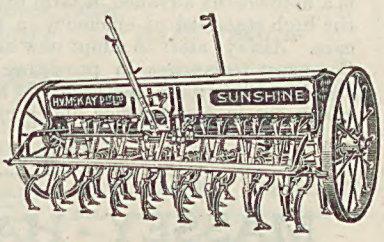

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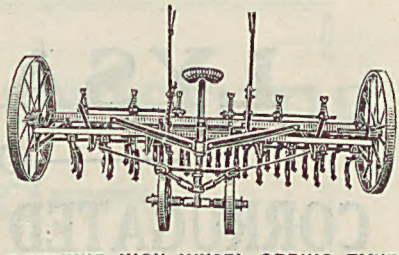

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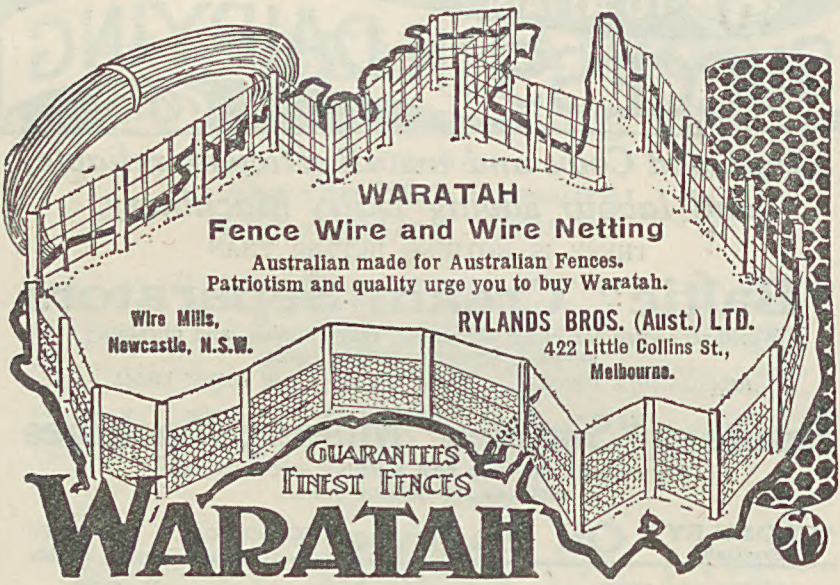

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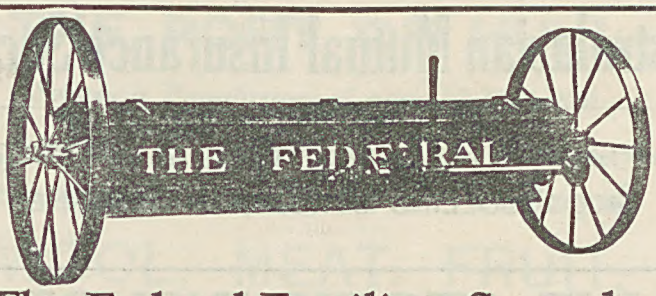

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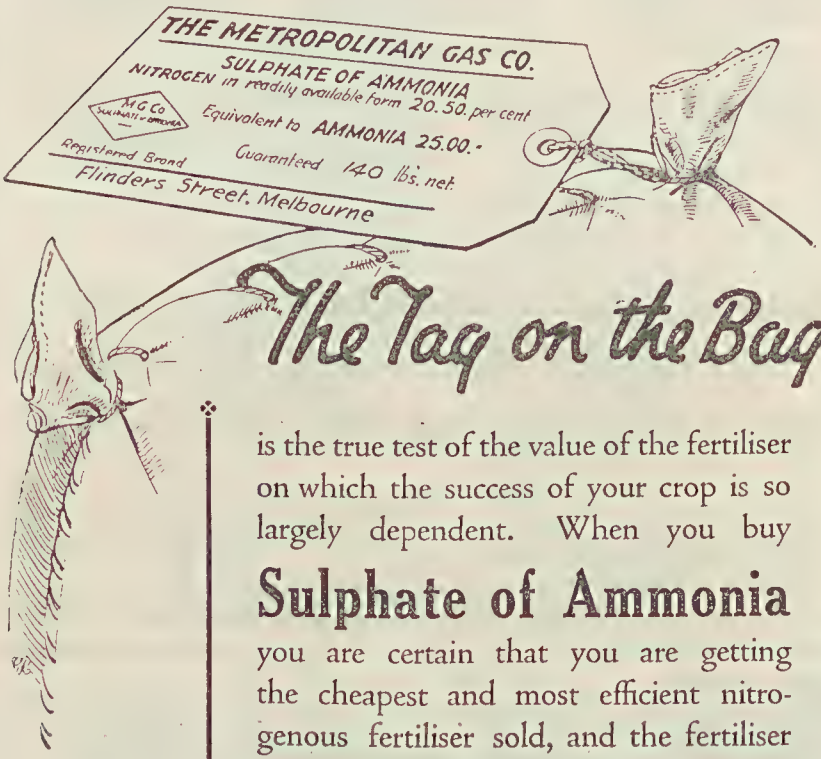

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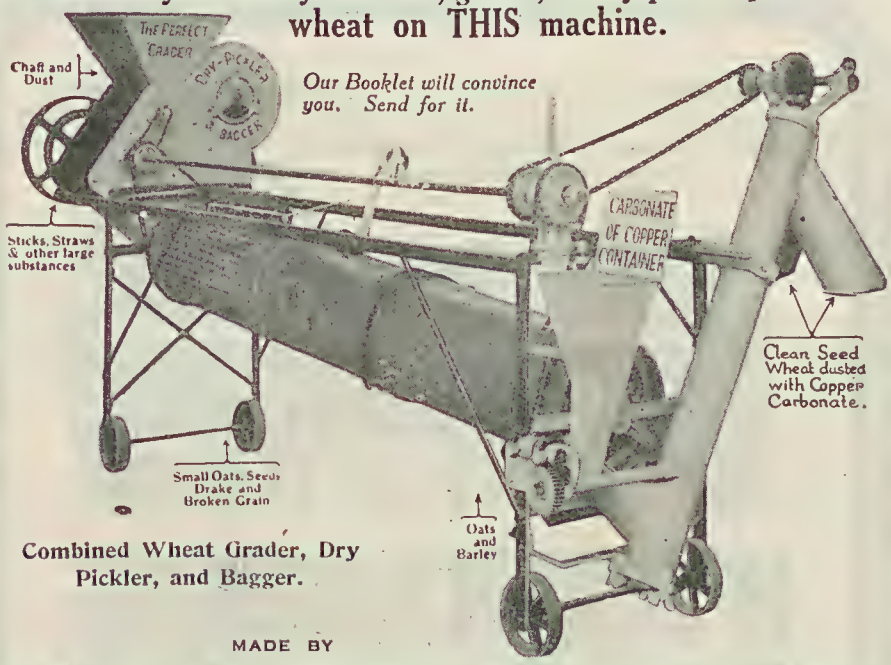
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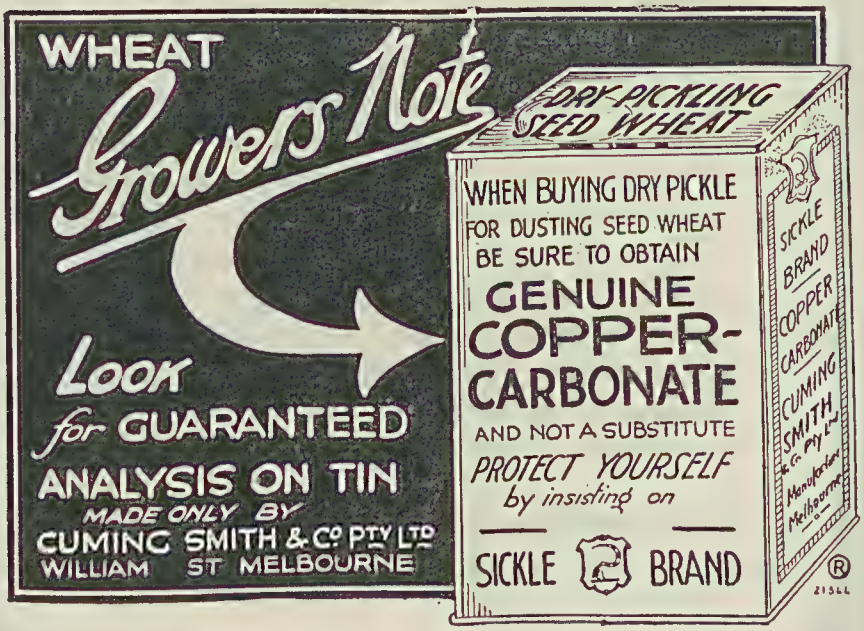
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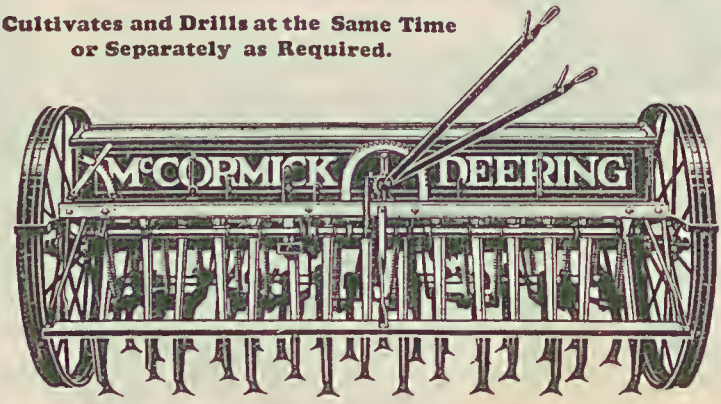

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POULTRY FEEDING EXPERIMENTS.

A REVIEW OF EXPERIMENTS AT THE STATE RESEARCH FARM, 1921-25.

J. E. Thomas, B.Sc., B.V.Sc., B. Agr. Sc.

In view of the growing importance of the Poultry Industry, which at present is worth about £4,500,000 per annum to the State, experiments were instituted in 1921 at the State Research Farm, Werribee, to investigate problems of poultry feeding. As in all cases of animal production, feeding is one of the three fundamentals. Breeding and culling have resulted in placing Victoria in a premier position as to individual performance per bird. There is, however, a big trend towards mass-production, and accurate information is badly needed in regard to the economics of feeding good quality poultry with the foodstuffs available.

In devising these experiments, individual deviation and experimental error were minimized by taking records over a full laying year, from 1st April to 31st March of the next year. In no cases were less than 36 birds selected, and due care was taken to ensure that the same number of daughters of each male bird used in the breeding pens were placed in each of the experimental pens. These experiments were designed to test out the farm grains, the value of self-feeding and the value of animal products. This work, notably trials with the self-feeder, afforded a good opportunity to study the nutritive value of foods when fowls were allowed to choose their own ration.

The term " balanced ration " has never had any workable significance in poultry feeding, due to the following reasons. Little is known of the nutritive requirements of fowls—few digestive co-efficients are available and the old method of basing standards on the digestive co-efficients obtained with the larger animals is inaccurate, often very much so. There is some similarity between swine and fowls in regard to the digestibility of feeds. In general, however, the recorded co-officients show that the amount of protein digested is lower with fowls than with other animals, and that fibre is practically indigestible and reduces the digestibility of the other constituents—protein, fat and soluble carbohydrates. In presenting the data, the co-efficients used in

determining the digestible nutrients represent the average results of trials up to 1923. In cases where no co-efficient had been experimentally determined, the figure from a food of like composition was taken. The analytical figures represent the actual analyses of the foodstuffs used or the averaged results of Departmental analyses. The financial results were calculated from the prices ruling for eggs and foodstuffs at the time of the experiment, but from the figures quoted they can be readily expressed in present-day prices.

It is, of course, probable that there is a considerable margin of error, due, as has been stated, to our imperfect knowledge of fowl nutrition. The figures, therefore, will have a relative value.

In addition to the actual nutrients the metabolizable energy is also tabulated. By this figure one represents in therms the energy value of the food for (1) maintenance, (2) heat production, (3) egg production. This figure was obtained from Arnsty's tables of metabolizable energy per unit of digestible dry matter for swine, on the assumption that the requirements of the pig and fowl are similar. This figure is valuable, as the fowl has normally a high energy requirement, due principally to the high energy requirements for egg production and the maintenance of a high body temperature—106-110 deg. F. It may be that some authors have exaggerated the importance of protein in the diet of the fowl and paid insufficient regard to the energy requirements. Fats and carbohydrates are the chief source of energy, and again the 12 per cent. of fat in the egg represents part of the transformed carbohydrates and possibly fat of the food. It will be shown that the ratio $\frac{\text{Digestible protein Ingested}}{\text{Protein in egg produced}}$ is higher—more so than the corresponding ratio between the input and output of protein in the dairy cow on maximum production. Many authors, basing their figures on the older co-efficients, have stated the correct nutritive ratio to be 1-4.5 for egg production. Under the conditions of the Werribee experiments, whether free choice or otherwise, the rations consumed showed a much wider nutritive ratio, i.e., they contained relatively less protein.

However, some other features of equally great importance must be considered. In tabulating the data, no allowance was made for green feed, which should give the bulk to the ration. The value of green feed is not directly nutritive. It contains a fair proportion of fibre which is practically indigestible, and, in comparison with the dry foods, the amount of nutrient present is but small.

Green feed is valuable for the following reasons:—

(1) It supplies succulence and aids digestion.

(2) It maintains the bowel in a proper working order.

(3) It supplies the pigment necessary for the coloration of the yolk.

(4) It furnishes a vitamine necessary for the health of the fowl.

The factor of palatability is of prime importance. Unless the food supplied is palatable and of sufficient variety, there is waste, the amount eaten is lessened, and the returns are correspondingly reduced. This is well seen in the case of dried butter-milk adding palatability to the mash, increasing food consumption, and giving a more than proportionate increase in profit.

It is well recognized that, with good fowls, heavy feeding pays by relatively cutting down the cost of maintenance.

The full details of these experiments are recorded in Bulletin No. 54, "Poultry Farming," and the last *Werribee Research Farm Guide Book.*

They were initiated by Mr. Rugg, Chief Poultry Expert, and were carried out with the co-operation of Mr. Pederick.

The relevant data are briefly summarized as follows:—

Table I.—Results of Free Choice Experiment (Test No. 1).

(a) Kinds of food and quantity of each consumed (36 White Leghorns for 359 days. No. of eggs produced, 6,251).

Kind of Food.	Quantity.	Protein.	Fat.	Carbohydrates.	Metabolizable Energy in Therms.
	lb.				
Bran	184·5	18·25	2·25	49·50	136·0
Pollard	229·0	17·90	4·46	83·10	204·9
Oaten Pollard ..	63·0	4·40	2·94	21·90	56·5
Barley Pollard ..	18·25	1·87	0·60	6·06	16·4
Meat Meal	67·5	34·10	12·47	..	111·0
Rape Seed Meal ..	11·5	2·14	0·26	1·84	8·2
Oats	475·75	32·50	28·50	224·0	550·0
Wheat	1,058·0	78·40	10·58	665·0	1,460·0
Barley	238·5	14·99	3·02	140·0	308·0
Maize	357·5	29·40	14·83	224·5	524·0
Total lb. ..	..	233·95	79·91	1,415·9	3,375·0

(b) Food requirements for maximun production August-November. Egg production 2,235.

	lbs.
Digestive Protein	90·4
Fat	69·8
Carbohydrates	526·6
Energy	1,263 therms.

Live Weight Record (Mean).

At beginning	3·06
At end	3.40
Gain	·34
Mean Weight	3·40

—	Protein.	Fat.	Carbohydrates.	Energy in Therms.	Nutritive Ratio.
(c) Nutritive requirements per full year in lb. per day.					
Per 3.40 lb. ..	·0184	·006	·094	0·26	1–6·8
Per 100 lb. ..	·540	·118	2·760	7·64	1–6·8
(d) Nutritive requirements for period of maximum production per day.					
Per 3·40 lb. ..	·0205	·007	·120	0·25	1–6·59
Per 100 lb. ..	·593	·206	3·525	7·34	1–6·59

Amount of Digestible Protein required to produce one egg over a full year—or Digestible Protein Cost of 1 egg .. .. .. ·0374 lb.

Production Ratio per full year $\frac{\text{Digestible Protein}}{\text{Protein content of egg}} = \frac{.0374}{.0156} = 2.39$

per maximum production period = 2·10

TABLE II.—RESULTS OF CONTINUOUS FEEDING EXPERIMENTS. (TEST NO. 2).

(a) Average requirements of 34·17 White Leghorns for 365 days. No. of eggs produced, 6,114.

Kind of Food.	Quantity.	Total Digestible Nutrients.			Energy in Therms.
		Protein.	Fat.	Carbohydrates.	
	lb.				
Bran	335				
Pollard	560				
Oats	910	238·8	95·9	1185·0	2973·4
Wheat	740				
Meat Meal	88				

(b) Daily nutritive requirements per full year per bird.

Protein.	Fat.	Carbohydrates.	Energy in Therms.
·0191	·0076	·0950	·238

Protein cost (as above) ·039 lb. Nutritive ratio 1–5·88.

TABLE III.—RESULTS OF FREE CHOICE EXPERIMENTS (TEST NO. 3).

(60 Black Orpingtons for 365 days—No. of eggs produced, 10,324.)

(a) Quantity of Food Consumed.

Kind of Food.	Quantity.	Total Digestible Nutrients.			Energy in Therms.
		Protein.	Fat.	Carbohydrates.	
	lb.				
Wheat	1350				
Oats	874				
Barley	682				
Maize	726				
Pollard	418	424·9	148·9	2579·9	6144
Oat Pollard ..	141				
Barley Pollard ..	434				
Bran	437·5				
Meat Meal	50·0				
Rape Seed Meal ..	36·5				

Initial Weight	4·14 lb.
Final Weight	4·81 lb.
Gain in Weight	0·67 lb.
Mean Weight	4·67 lb.

(b) Nutritive requirements over a full year per bird per day in lb.

—	Protein.	Fat.	Carbohydrates.	Enery in Therms.	Nutritive Ratio.
Per 4·67 lb. ..	·0194	·0068	·1179	0·28	1–6·85
Per 100 lb. ..	.415	.145	2.52	6.00	

Digest. protein cost of 1 egg, ·0413 lb.

(c) Nutritive requirements per period of maximum production—October. (Eggs produced, 1,039.)

—	Protein.	Fat.	Carbohydrates.	Energy in Therms.	Nutritive Ratio.
Per 4·67 lb. ..	·0205	·0067	·124	·293	
Per 100 lb. ..	·439	·143	2·65	6·27	1–6·77

Digest. protein cost of 1 egg, ·0367 lb.

TABLE IV.—FOOD REQUIREMENTS FOR FULL YEAR OF CHECK PENS GIVEN REGULAR FEEDING (FREE CHOICE TEST NO. 1).

(a) Free Choice—Test No. 1—White Leghorns.

(1) *Dry Mash.*

—	Protein.	Fat.	Carbohydrates.	Energy in Therms.	Nutritive Ratio.
Per 3·38 lb. ..	·0208	·0057	·1042	·26	1–5·6
Per 100 lb. ..	·619	·169	3·08	7·65	

Egg production, 6,101. Digest. protein cost of 1 egg, ·044 lb.

(2) *Wet Mash.*

—	Protein.	Fat.	Carbohydrates.	Energy in Therms.	Nutritive Ratio.
Per 3·38 lb. ..	.022	.0064	.0985	.25	1–5·2
Per 100 lb. ..	·795	·1890	2·92	7·40	

Egg production, 6,503. Digest. protein cost of 1 egg, ·0435 lb.

(b) Live weight records in lb.

—	Dry Mash.	Wet Mash.
Initial	3·19	3.13
Final	3·44	3·45
Gain	·25	.32
Mean	3·38	3·38

TABLE V.—RESULTS OF CHECK PEN—REGULAR AS AGAINST CONTINUOUS FEEDING (TEST 2).

(Average of 34.6 White Leghorns per 365 days—Egg production, 5,671.)

Daily intake in lb. per bird.

Protein.	Fat.	Carbohydrates.	Energy in Therms.	Nutritive Ratio.
·0204	·0084	·103	·257	1–5·9

Digest. protein cost per egg, ·045 lb.

TABLE VI.—RESULTS OF CHECK PEN (WET MASH) TO FREE CHOICE (TEST NO. 3).

(60 Black Orpingtons for 365 days—Eggs produced, 9,704.)

Daily intake in lb.

—	Protein.	Fat.	Carbohydrates.	Energy in Therms.	Nutritive Ratio.
Per 4·65 lb. ..	·021	·0068	·117	·278	1–6·24
Per 100 lb. ..	·452	·147	2·56	6·00	

Digest. protein cost of 1 egg, ·0477 lb.

Live weight record in lb.

Initial	4·04
Final	4·80
Gain	·76
Mean	4·65

TABLE VII.—SUMMARY OF RESULTS OF EXPERIMENTS DETAILED IN TABLES I. TO VI.

White Leghorns.					Black Orpingtons.	
Test 1.			Test 2.			
Free choice.	Wet Mash.	Dry Mash.	Continuous.	Regular.	Free Choice.	Wet Mash.
Profits per Bird per year.						
s. d. 15 2¾	s. d. 16 3	s. d. 14 3½	s. d. 16 10	s. d. 13 0½	s. d. 17 6¼	s. d. 14 9¼
Digest Protein Cost per Egg in lb.						
lb. ·0374	lb. ·0435	lb. ·044	lb. ·039	lb. ·0459	lb. ·0413	lb. ·0477
Total Amount per Head of Food Consumed in lb.						
76·2	76·9	79·9	76·9	83·7	85·8	86·5
Nutritive Ratios.						
6·8	5·2	5·6	5·88	5·94	6·85	6·24

Table VII. (*continued*).—Summary of Results of Experiments Detailed in Tables I. to VI.

White Leghorns.					Black Orpingtons.	
Test 1.			Test 2.			
Free choice.	Wet Mash.	Dry Mash.	Continuous.	Regular.	Free choice.	Wet Mash.
Eggs Produced per Bird per Year.						
173·6	180·6	169·5	179	164	172	161
Gain in Weight during Experiment in lb.						
·34	·33	·25	..	..	·67	·76
Eggs Laid from 1st April to 31st July as percentage of total.						
23·6%	21·1	19·1	24·2	24	31·6	29·6

Conclusions from Foregoing Results.

(1) With one exception, the maximum profit was shown when free choice, or continuous methods of feeding, were adopted, and the percentage of eggs laid during that period of the year when eggs are dearest was always slightly greater when free choice methods were adopted.

(2) The amount of food consumed per head was less when free choice methods were adopted, and there was no marked gain in live weight when the birds were fed continuously, even in the case of Black Orpingtons. Free choice feeding was more expensive in regard to cost of food, but production was more than proportionately increased, so there was a much greater profit shown.

(3) The digestible protein cost of one egg was always lower in the free choice pens.

(4) There is no apparent direct relation between nutritive ratio and egg production, though it is significant that the ration with the narrowest nutritive ratio (1-5.3) gave the highest returns in eggs per bird.

As against this, however, the birds in the free choice pens always consumed a ration of a wider nutritive ratio.

One cannot postulate that the same conclusions will hold true when regular methods of feeding are adopted, since in the free choice trials the availability is the most important factor.

The following comparative tables are useful:—

Table VIII.—Showing (1) Wheeler's Standard Requirements of Birds on Full Lay (U.S.A.) and (2) Food Consumed by Birds in the Several Experiments at the State Research Farm, Werribee.

(a) Wheeler's standards (per 100 lb. live weight).

Weight of Birds.	Protein.	Fat.	Carbohydrates.	Enery in Therms.	Nutritive Ratio.
3 to 5 lb.	1·0	·35	3·75	10·3	1–4·6
5 to 8 lb.	·65	·20	2·25	6·2	1–4·2

TABLE VIII. (*continued*).

(b) Intake in Werribee Free Choice experiments—First Year Birds.

Weight of Birds.	Protein.	Fat.	Carbohydrates.	Enery in Therms.	Nutritive Ratio.
Per 3·40 lb. ..	·59	·21	3·52	7·34	1–6·59
Per 4·67 lb. ..	·46	·143	2·65	6·27	1–6·77

(c) Intake in other Werribee experiments—Regular Feeding Method.

Weight of Birds.	Protein.	Fat.	Carbohydrates.	Enery in Therms.	Nutritive Ratio.
Per 3·40 lb. ..	·65	·179	3·22	7·9	1–5·60

It will be noted that, calculated on 100-lb. basis, the food energy requirements are much less for heavier birds. The reason of the lower protein requirements and consequent wider nutritive ratio can be ascribed partly to the lower digestive co-efficients for protein as found in recent trials. A field of inquiry is the testing of rations of different nutritive ratios to determine actually what is the benefit, if any, of feeding more protein. In practice this would mean the addition of more meat meal or dried butter-milk to the ration.

Maize Feeding Experiment.

This experiment was devised to test whether maize could be fed safely the whole year round, as in the United States of America. The results proved beyond doubt that it may.

TABLE IX.—RESULT OF MAIZE FEEDING EXPERIMENTS.

(Average of 34.92 birds for 365 days—No. of eggs produced, 5,436.)

Food.	Quantity.	Intake per bird per diem.				
		Protein.	Fat.	Carbohydrates.	Nutritive Ratio.	Energy in Therms.
	lb.					
Maize Meal ..	330					
Crushed Maize	1,372					
Bran ..	330	·022	·0084	·123	1–6·4	·30
Pollard ..	330					
Wheat ..	450					
Meat Meal ..	99					

Digest. protein cost of one egg, ·052 lb.

Conclusion to Foregoing Results.

This experiment showed from the egg return and the complete absence of any ill effects on the health of the birds—even during the warm months—that maize can be fed safely, comprising, as it did here, 58 per cent. of the ration. Some features as regards the food value and limitations of maize are interesting. These are the high

protein cost per egg and the high energy intake. The quality of the maize protein is a limiting factor. It is known now that the maize protein is badly balanced—it lacks some of the essential amino-acids. For this reason it should be supplemented with a fair amount of animal protein—apparently separated milk or dried butter-milk are the most suitable sources. Such a ration would probably give very satisfactory results, the animal protein supplementing the maize, and the maize supplying a high amount of metabolizable energy.

Cereal Feeding Experiment.

Table X.—Showing Amount of Different Grains Consumed and Profit per Bird per Year.

Pen.	Mash.	Oats.	Wheat.	Barley.	Per Bird per day.		Mean production per bird.	Profit per bird per year.
					Protein.	Therm.		
								s. d.
Oats ..	41·2	50·0	2·03	2·03	·0196	·269	170	16 8
Wheat ..	35·7	..	49·5	1·8	·0187	·276	150·5	11 6½
Barley ..	34·3	..	1·7	50·88	·0170	·262	144·3	14 10¾
Mixed Grains	32·45	10·8	23·2	12·4	·0163	·240	157·5	14 1½

This experiment appears to show that oats can be used as an effective substitute for wheat. However, it will be noted there is a connexion between daily intake of protein and egg yield, and it is possible that part of the good results in Pen 1 may have been due to the more liberal scale of feeding adopted.

Table XI.—Showing Approximate Percentages of each Constituent Consumed in Free Choice Experiments.

—	Black Orpingtons.		White Leghorns.	
Wheat	26·2		39·20	
Oats	17·0		17·6	
Barley	13·2	70·5	8·8	78·8
Maize	14·1		13·2	
Mill Products ..		28·5		18·7
Meat Meal		1·0		2·5

It will be observed that the amount of grain consumed varied from 70 to 80 per cent., the order of preference being wheat, oats, maize or barley.

Conclusions from Foregoing Results.

From this and from cereal tests, we may reasonably assume that at least 50 per cent. of the grain ration can be substituted by other grain than wheat, particularly in view of the lower prices of oats and barley in comparison with wheat. Besides this, a variation in grains renders the mixture more palatable—a feature the importance of which has been stressed. The results of the mixed grain trials in the cereal feeding pens are not decisive, as here the amount fed was low in comparison with that allowed the other pens.

The features rendering wheat so popular are:—(1) Its fairly high protein content; (2) its low fibre content. As is known, the cost of digesting fibre is high, with the result that less is available for egg production.

The figure stated—metabolizable energy or fuel value—is not a true guide to the egg-producing value of a food, as it includes the energy spent in digesting the food. The net energy—the amount strictly available for the fowl—is equal to the metabolizable energy less the cost of digestion—which is much greater with fibrous foods than others. However, no net energy values for poultry foods are available.

TABLE XII.—SHOWING NUTRITIVE VALUE OF CEREAL GRAINS FOR FOWLS.

	Total Digestible Dry Matter.	Digestible Protein.	Fibre Content.	Metabolizable Energy.
Wheat	71·0	7·5	2·7	138·0
Oats	59·8	6·8	8·9	116·0
Barley	66·3	6·3	5·4	128·5
Maize	75·5	8·2	2·0	146·0

Wheat and maize are high in energy and low in fibre. The drawbacks of maize have already been discussed; with oats the disadvantage of a high fibre content is counterbalanced by a high oil content. Barley has a fairly high fibre content, but has a high energy value, and, as was noted with maize, was particularly relished in the winter months.

TABLE XIII.—COMPARISON OF VALUE OF MEAT MEAL AND DRIED BUTTER-MILK.

(Continuous feeding with bran, pollard, and meat meal allowed. Test made in each case with 60 Leghorns during a period of 365 days.)

(a) Meat Meal.

Food.	Quantity.	Total Protein.	Protein per Bird per diem.	Total—Fat.	Fat per Bird per diem.	Total Carbohydrates.	Carbohydrates per Bird per diem.	Total Therms.	Therms per Bird per diem.	Nutritive Ratio.
	lb.									
Wheat ..	1623									
Oats ..	812									
Barley ..	421									
Maize ..	407	466·05	·0216	148·88	·0068	2407·2	·111	5917	·270	5·88
Pollard ..	957									
Bran ..	574·5									
Meat Meal	195·5									

LIVE WEIGHT RECORD.

	lb.
Initial weight	3·16
Final weight	3·76
Gain in weight	·50
Mean weight	3.38

Total egg production, 10,484. Digest. protein cost of one egg, ·445 lb.

Table XIII. (*continued*).—Comparison of Value of Meat Meal and Dried Butter-milk.

(b) Dried Butter-milk.

Food.	Quantity.	Total Protein.	Protein per Bird per diem.	Total—Fat.	Fat per Bird per diem.	Total Carbohydrates.	Carbohydrates per Bird per diem.	Total Therms.	Therms per Bird per diem.	Nutritive Ratio.
	lb.									
Wheat ..	1657									
Oats ..	828									
Barley ..	412									
Maize ..	407	489·6	·0223	122·1	·0056	2632·4	·120	6363	·29	1–5·92
Pollard ..	1198·5									
Bran ..	719·5									
Dried Butter Milk	239·5									

Live Weight Record.

	lb.
Initial weight	3·16
Final weight	3·53
Gain in weight	·37
Mean weight	3·46

Total egg production, 12,688. Digest. protein cost of one egg, ·385 lb.

Comparison of value as shown by profits per hen over cost of feed during period of test (one year).

	£	s.	d.
Dried Butter-milk	1	1	0
Meat Meal		16	11½
Difference in favour of Dried Butter-milk ..		4	0½

Prices at time of experiment—
Dried Butter-milk—approximately 3d. per lb.
Meat Meal—approximately 2d. per lb.

Conclusion from Foregoing Results.

The figures in Table XIII. reveal the high value of dried butter-milk as a source of animal protein. Part of this superiority of dried butter-milk can be ascribed to the increased palatability of the mash, giving a greater food intake and consequent greater return in eggs.

During the year the dried butter-milk pen consumed 489.6 lb. of digestible protein, and the meat meal pen 466 lb. However, the dried butter-milk must be intrinsically more valuable, as the digestible protein cost of one egg was as follows:—

Dried butter-milk	·0395 lb.
Meat Meal	·0445 lb.

The only explanation is that in view of our newer knowledge of nutrition the milk protein contains amino-acids which are more correctly balanced for egg production than the meat proteins.

It is advisable to stress the value of dried skim milk or dried butter-milk—the food values of which are almost equal—as against

dried whole milk. Samples of dried milk examined by the departmental chemist showed high and varying amounts of fat and corresponding lesser amounts of protein.

Dried separated milk or dried butter-milk should contain not more than from 1 to 2 per cent. of fat. Dried butter-milk should show an analysis of from 30 to 33 per cent. of protein, and dried separated milk from 35 to 38 per cent. One gallon of skim milk or of butter-milk is equal to approximately 0.9 lb. of the dried product.

Meat meal varies greatly in composition; it should be bought always on analysis. A good grade must be wholesome and contain not less than 50 per cent. protein. The fat content varies from 12 to 20 per cent.

Table XIV.—Showing Relation between Digestible Protein, Egg Production, and Therms of Metabolizable Energy.

Feed.	Protein Intake per head per diem.	Therms per day.	Eggs per bird per year.
	lb.		
White Leghorns—			
Maize	·0220	·300	156·0
Wheat	·0187	·276	150·5
Oats	·0196	·269	170·0
Barley	·0170	·261	144·3
Mixed Grain	·0163	·241	157·5
Free Choice	·0184	·260	173·6
Wet Mash	·0220	·250	180·6
Dry Mash	·0208	·257	169·5
Regular Feeding ..	·0200	·257	164·0
Continuous Feeding ..	·0190	·238	179·0
Dried Butter Milk ..	·0220	·290	211·5
Meat Meal	·0210	·270	174·7
Black Orpingtons—			
Free Choice	·0194	·280	172·0
Wet Mash	·0210	·278	161·0

There are not sufficient data to work out correlation co-efficients between (1) egg yield and protein intake and (2) egg yield and energy intake, but a perusal of all the data suggests a slight connexion between egg yield and protein intake. It is possible, perhaps, that a higher protein intake might give a better return. Whether or not this would be a payable proposition remains to be proved.

CONCLUSION.

In conclusion, some idea of the experimental work proposed at Werribee might be of interest. Attempts are to be made to compare the values of rations of varying nutritive ratios, and to determine what profit, if any, can be obtained by feeding more protein.

The value of green feed in the diet of fowls is to be investigated, using four pens. Pen 1, to be fed no greenstuff. Pen 2, succulent greenstuff. Pen 3, lucerne chaff. Pen 4, sprouted oats. By this method, the effect of greenstuff on the health and production of the bird can be noted. The effect of the addition to the ration of minerals —in particular, phosphoric acid—is to be tried out.

In all trials to date, the egg yields are those of birds in their first laying season; to note the effect during the second year, the birds in the meat meal versus dried milk pens are being carried on over the second year.

Some trials on the fattening of capons are in progress. It is expected that the results of these will, as they become available, furnish the poultry-keeper with accurate information on one of the most important phases of his calling, and thereby assist him to keep down the cost of production.

NHILL CROP AND FALLOW COMPETITION, 1925.

Conducted by the Nhill Agricultural and Pastoral Society.

Report of the Judge, H. A. Mullett, Superintendent of Agriculture.

A more exacting test can scarcely be imagined than that to which farming methods in the Nhill district, and indeed the whole of the wheat belt, were subjected during the year 1925. At no time except in May, when 230 points fell, was the precipitation at Nhill anything but meagre. By the end of September only 7 inches and 89 points had fallen, then the rains practically failed. In October 22 points was all that was recorded, and there was no rain at all in November until the third week, when most of the crops were too far advanced to benefit materially.

Droughty conditions and withering hot winds made extreme demands on the reserves of moisture in the subsoil, upon which the crops were wholly dependent in the absence of rain. The blasting effect of the winds was so severe that in most crops in the district there were patches in which the ears had been withered while very tender, as they emerged from their protecting sheath; but despite all this, for the most part the yields have been surprisingly good. From some paddocks as high as fourteen bags to the acre are reported to have been stripped, and there is no reason to doubt the figures, though crops as good as this were not numerous. However, the average yields of eight 20-acre fields of wheat entered in the Turner Cup competition was 29 bushels per acre, and this figure can be vouched for because the wheat was weighed over the local weighbridge, and each area was measured. These areas were scattered throughout the district, and the yields can be taken as fairly typical of the results likely to have been obtained over fairly large areas on first class black soil correctly farmed.

During recent years wheat-growers at Nhill and throughout the Wimmera generally have radically altered their methods along highly specialized lines. Over-specialization sometimes leads to a breakdown when unusual conditions such as drought have to be faced. The fact that the methods have emerged triumphant from as severe a test as could well have been proposed is convincing proof, if any is needed, that the basic scientific principles upon which the methods are founded are sound. In other words, the present prosperity of the Wimmera is built upon something which is essentially durable, and which is practically drought-proof.

These remarks apply more especially to land being worked under a three or four course rotation system, involving the grazing of live-stock, as on most Nhill farms. Lower down on the plains, where land values are higher, there is a growing tendency to dispense with sheep, because wheat is a more profitable crop than grass there. Such a system

gradually tends to reduce the supplies of humus in the soil, and upon this material the water-holding capacity of the soil largely depends. One cannot picture a soil depleted of its humus maturing heavy wheat crops under conditions similar to those that prevailed last year, and those who have largely dispensed with sheep should realize that such a practice cannot be prolonged indefinitely without gradually declining yields. The fact that high yields are being maintained so far, and even increased, shows that humus exhaustion cannot have proceeded to any great extent as yet; but, nevertheless, it is taking place, and some day will assert itself. When it does, yields will decline, and land values on the depleted farms will fall in sympathy. A prosperity which is founded on a practice of mining the soil is fundamentally unsound, and those who have interests in the Wimmera ought to recognize the position.

Mr. C. F. H. Reichelt's Crop of Federation.

While the soil continues to yield bumper crops when farmed on the fallow-wheat-fallow-wheat system, those who wish to bring about the adoption of a more rational rotation can hardly expect to receive attention unless they can demonstrate the rate at which the exhaustion is proceeding and state when the supplies are likely to give out. Of course, it is possible to make academic calculations from figures which already exist, but they cannot be very convincing. The only sound basis is well conceived research, and the Department hopes to undertake this in the near future.

The Competition, 1925.

Owing to the dry conditions the number of competitors was not so great as usual, but, nevertheless, the entry was satisfactory. There were 43 in the section for crops and 28 in the section for fallows—a total of 71 entries. On account of a downpour of rain during the progress of the competition, the judging of the fallows had to be deferred until February.

A feature of the competition this year was the judging of the first series of crops entered for the R. B. Turner Cup (25 guineas).

This competition, which by a novel method promotes the conduct of an extensive series of competitive experiments under accurately supervised and controlled conditions on private farms, has been the means of obtaining valuable data in relation to the comparative yields of wheat grown on winter fallow and on summer fallow. This competition will form the subject of a separate report, but it can be stated that the results confirm in no uncertain way the high opinion that Wimmera farmers have a summer fallow. Averaging the results from the eight competing farms, there is a difference of over two bushels to the acre in favour of summer fallows.

Loose smut was noticed in many of the wheat crops. There can be no doubt that this disease has increased during recent years, which appear to have been favorable to its development. It is not unusual to find one per cent. of the crop destroyed, and occasionally the damage is as high as seven or eight per cent.

Growers cannot afford to ignore any disease taking such toll of a crop, and organized methods of treatment must be evolved. Inasmuch as the fungus causing the disease gains entrance to the young grain at flowering time, and hibernates in the grain until it is sown, no ordinary method of pickling the surface of the grain is of avail. The only method which has proved satisfactory is what is known as the Jensen hot water treatment. A modification of his method, proposed by Jensen himself, is to steep the wheat in cold water for a lengthy period, and then in hot water at about 132 deg. C. The temperature must be kept constant, because if it rises more than a few degrees the grain is damaged, and if it falls a few degrees the fungus is not killed. Such a method is slow and requires careful adjustment of the technique; hence it cannot be recommended for use on the average farm. The only course open to the farmer is to obtain seed from crops which he knows to be clean.

Tests are being instituted at the State Farms with a view to eliminating loose smut from the wheat grown there. When these arrangements have been successfully completed farmers will be able to obtain fresh seed which could be used to form a nucleus of clean seed. However, it will be essential to grow this in a spot isolated from other crops, as the spores of the fungus are readily dispersed by wind.

Loose smut was very prevalent last year, and farmers who used copper carbonate pickle for the first time were inclined to regard the new pickle as ineffective; but, as pointed out, no method of pickling is successful, and crops pickled in various ways were equally affected.

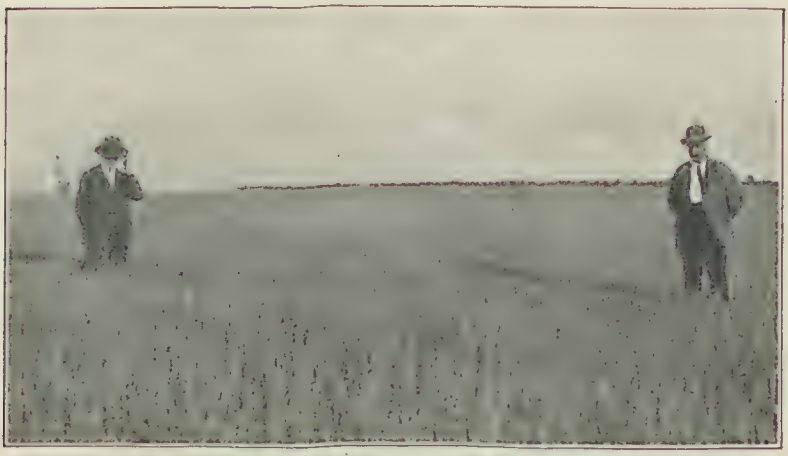
Blighted Heads.

Over considerable areas of wheat, especially at Lorquon, and in patches in most crops, there were blighted heads. Many surmised that a frost had caused the damage, but careful inspection showed it to be due to hot winds. Any heads just emerging from the sheath when the scorching winds arrived were liable to damage, because at that stage for a day or so the head is extremely tender. Of the varieties sown in the district Gallipoli 58 showed most signs of tipping, but despite the tipped appearance of the heads in many paddocks it yielded well, and in several cases headed the list.

Stinkwort.

Stinkwort infests the light scrub and Mallee lands around Nhill, but is not troublesome on the better class soil. To grow wheat successfully

in competition with it, it is essential to prevent its appearing on the fallow, and this can be done only by thorough cultivation. The great value of even one extra cultivation at a time judiciously chosen is illustrated by the experience of Mr. F. Moar. Having been stopped by rain at hay cutting time, he lightly scarified a strip in a paddock of fallow. After completing a round or two it was decided to abandon the work, as the soil was so hard that the scarifier was only scratching it. In the following autumn wheat was sown over the whole paddock; the resulting crop was light, but the strip stirred by the scarifier in November could be traced to an inch, and on it the crop was much thicker, taller, heavier, and later. The check given the stinkwort by the cultivation while it was still very short considerably reduced its vigor, and thus it did not make such demands on the stored moisture and on the plant food in the soil here as on the rest of the field.



Does a Forage Crop Hurt the Fallow?
Effect on the wheat crop of sowing the fallow (on the right side of picture) to millet. (Mr. W. E. Dahlenburg's, Salisbury.)

Results.

Section 1—Best Half (at Least 75 Acres) of Wheat Crop.

R. Blackwood first 93 points, E. G. Hoffman second 91 points, F. W. Kluge and Blackwood third, 90 points—Possible points 100.

The winning crop—Wannon and Free Gallipoli (Gallipoli 58)—was portion of a paddock of 100 acres, of which the outstanding features were its purity, evenness, and absence of weeds. The crop was a comparatively short one, but well headed, level, and true to type. Mr. Blackwood has been wonderfully consistent in producing crops of this class during the past seven years, so that the methods he adopts are of unusual interest. The soil is a first class grey-black clay loam, which responds to the highly specialized treatment given it. In grass the year before, the paddock was summer-fallowed in March with a plough to 4½ inches deep, i.e., rather deeper than is usual, then harrowed. In June it was scarified to 3 inches deep, and then commencing at the end of May, spring-toothed shallowly four times in all after rain during the spring and in the autumn. The wheat—pedigreed seed from the Government experimental plots at Salisbury—was "combined in" from 14th to 24th

June at the rate of 75 lb. per acre, with 1¼ cwt. of 22 per cent. super. The paddock contains about three acres of stiff red land, and these patches had been liberally treated with gypsum with the object of improving the texture, and thus improving the crop—a result successfully accomplished. The pickle used was copper carbonate at the rate of 2 oz. per bushel.

Mr. E. G. Hoffman's crop, Federation, shown in two paddocks, was perhaps the heaviest in the competition. It was true to type, and in comparison with the winner lost an extra point or two on the score of the presence of wild oats and unevenness. The unevenness was due to 20 acres of lighter crop on winter fallow. On 60 acres of summer fallow the crop was amazingly heavy and well grown. Like that of the winner, the summer fallow was ploughed in March after rain and harrowed immediately after. In August scarified, and in October spring-toothed, and then harrowed. Sheeped throughout the summer, the paddock was " combined in " at the end of May and harrowed. 75 lb.

Comfortable Farm Residence of Cement Brick erected by Mr. J. T. Marshall, Lorquon.

of seed and 80 lb. of 22 per cent. super. were used, the seed being pickled with formalin.

Messrs. F. W. Kluge and R. Blackwood's crop comprised Federation and Wannon, portion of a paddock of 135 acres summer-fallowed in February and March, wet. In July it was scarified, and subsequently received successive strokes with the spring-tooth in August, September, and October. After harvest it was harrowed, and sown in mid-June with 75 lb. of seed per acre, and 112 lb. of 22 per cent. super., then harrowed twice. The crop was short, dense, and regular, clean underfoot, though a patch of mustard was noticed. Copper carbonate was the pickle used.

Messrs. J. and T. W. Rintoule's crop consisted of Federation and Wannon varieties. The yield was heavy, but the crop was not quite so regular as some, and a little wild oats was showing. The portion of this crop on well worked summer-fallow was sown in early June with a combined drill, with 75 lb. of seed and 94 lb. of 22 per cent. super.

Mr. C. Reichelt's crop, Federation, was on winter-fallow, on black soil on the Mallee fringe. When lying fallow portion of this paddock had

been flooded, and by judicious working this moisture had been conserved for use of the crop. From the heaviest portion of the paddock hay had been cut at the rate of three tons per acre—an indication of the height and density of the crop.

Another crop of interest was that of Mr. James Batson, grown on well worked fallow, part summer-fallow and part winter-fallow. The seed, Federation, was "combined in" early in June; 75 to 80 lb. of seed and 112 lb. super. per acre were used. The copper carbonate method of pickling was adopted.

Details of Award.

SECTION 1—BEST HALF (AT LEAST 75 ACRES) OF WHEAT CROP.

Competitor.	Variety.	Yield.	Purity.	Absence of—		Even-ness.	Total.
				Weeds.	Disease.		
Possible points ..	.. .. ..	35	20	15	15	15	100
R. Blackwood ..	Wannon, Gallipoli 58	34	19	14	11	15	93
E. G. Hoffman ..	Federation ..	35	19	13	12	12	91
F. W. Kluge and R. Blackwood	Federation, Wannon	33	17	12	14	14	90
J. and T. W. Rintoule	Federation, Wannon	33	18	13	13	12	89
C. F. H. Reichelt ..	Federation ..	29	18	14	14	14	89
James Batson ..	Federation ..	32	18	12	11	14	87
Peter Bone ..	Federation, Gallipoli 58	28	19	12	14	14	87
Alf. Dahlenburg ..	Federation, Wannon	26	19	13	12	12	82
W. E. Dahlenburg	Huff's Imp., Nizam, Sepoy, Federation	25	19	11	13	13	81
Alf. Schultz ..	Federation ..	29	18	11	12	10	80

SECTION NO. 2—BEST MALLEE CROP OF 100 ACRES.

R. Buckley, first, 79 points; T. G. Marshall, second, 71 points; A. E. Duthie, third, 70 points.

The yield of the winning crop was an excellent example of what the Mallee can produce on a meagre rainfall, provided scientific farming methods are used. Dollar and Huff's Imperial varieties had been sown on well worked summer-fallow; 90 lb. of seed and 93 lb. of 22 per cent. super. were used per acre. The crop was practically uniform over the whole 100 acres, and the yield should have exceeded eight bags an acre. The crop was free from strangers.

The year prior to fallowing the paddock it had been sown to oats cut for hay; then it was summer-fallowed in March with a disc cultivator to three inches deep, and harrowed. In July weeds were scarified out, an operation repeated five or six weeks later. In October it was spring-toothed and harrowed, and later sheeped. In autumn prior to sowing, the paddock was worked up with the spring-tooth, then "combined in" at the end of June and harrowed. Some ball smut was noticed, and points were heavily deducted; but the competitor had such a strong lead that he still had points to spare. Bluestone was the pickle used.

The varieties shown by Mr. T. G. Marshall were Federation and Gallipoli 58. As in the case of the winner, oats preceded the fallow,

which was ploughed in June, harrowed in July, scarified in September, and again in October, then harrowed in December, and again in April after light rain. The seed, at the rate of 80 lb. an acre, with 90 lb. of 22 per cent. super., was "combined in" in June, second week, and then harrowed three days later to check weeds. Bluestone was the pickle.

Mr. A. E. Duthie showed Hard Federation, Federation, and Budd's Early. The yield was satisfactory, but points were deducted on the score of weeds, disease, and general unevenness. The crop was grown on winter-fallow and sown early in June with 60 lb. seed and 91 lb. of 22 per cent. super. an acre.

Details of Award.

Section 2—Best Mallee Crop of 100 Acres.

Competitor.	Varieties.	Yield.	Purity.	Absence of—		Evenness.	Total.
				Weeds.	Disease.		
Possible points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**
R. Buckley ..	Huff's Imperial, Dollar	25	19	14	6	15	79
T. G. Marshall ..	Federation ..	20	16	11	11	13	71
A. E. Duthie ..	Hard Federation, Federation, Budd's Early	24	14	10	10	12	70
F. Moar	Federation, Penny	17	17	12	13	10	69
Beacom Bros. ..	Federation ..	11	14	11	12	9	57

Section No. 5—Highest Aggregate for Red Fallowed Land, 1924, and for Crop on it, 1925.

This competition thus extends over two years, and was intended to promote interest in the methods of working stiff red clays. However, owing to paucity of entries, the section is open to any class of red soil.

Messrs. Beacom Bros. were awarded 154 points out of a possible 200, and Mr. C. P. Dahlenburg and Mr. V. Collins 152 each.

The winning crop was Huff's Imperial, grown on red Mallee soil which is, of course, friable. The crop was light, and the method of working the fallow was described in a previous report. The paddock—winter-fallow—was "combined in" in mid-June, with 75 lb. of seed an acre and 92 lb. of 22 per cent. super., using copper carbonate as the pickle.

Mr. C. P. Dahlenburg's crop was adjudged heaviest in this section, but wild oats were thick in it, and points were deducted accordingly. The soil was the true refractory red which is so difficult to work. The paddock was ploughed early in June and in July, and then harrowed at the end of each day's ploughing, an important consideration in preventing the formation of hard clods on this class of soil. A fortnight later another harrowing was given. This was followed by strokes with the spring-tooth in early August, in mid-September, and in mid-November. In autumn a part was "knife barred" and the balance harrowed. Federation, Huff's and Wannon were the varieties sown. They were "combined in" during mid-May at the rate of 75 lb. per

acre with 112 lb. of 22 per cent. super. The seed was pickled with bluestone.

On this class of soil the copper carbonate method of pickling will be found a very marked advantage, because of the superior germination resulting. Dressings of gypsum at the rate of one ton per acre would improve the texture to a large extent.

Short dense Wheat Crop grown by Mr. R. Blackwood, Kiata.

Details of Award.

Highest Aggregate for Red Fallowed Land (100 Acres) 1924, and Crop on the Fallow, 1925.

Competitor.	Variety.	Yield.	Purity.	Absence of— Weeds.	Absence of— Disease.	Evenness.	Total for— Crop, 1925.	Total for— Fallow, 1924.	Aggregate.
Possible points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
Beacom Bros. ..	Huff's Imp.	10	18	11	13	11	63	91	154
C. P. Dahlenburg ..	Federation, Huff's Imp., Wannon	12	17	8	11	10	58	94	152
V. Collins ..	Huff's Imp., Federation	11	17	10	10	10	58	94	152

Section 8—Highest Aggregate for Whole of Fallow, 1923; Crop on the Fallow, 1924; Whole of Fallow, 1924; Crop on the Fallow, 1925.

Competitors in this section are set a difficult task. The whole of the fallow and the crop on the farm are judged for two years.

Mr. R. Blackwood was awarded 369 points out of a possible 400, first; Mr. W. E. Dahlenburg was awarded 357 points out of a possible 400, second; Mr. E. G. Hoffman was awarded 336 points out of a possible 400, third.

The methods of the first and second prize winners have been previously outlined. Mr. W. E. Dahlenburg showed a number of varieties, including Huff's Imperial, Nizam, Sepoy, Federation, Gallipoli 58, Federation, and Wannon—the whole of these new high class seeds having come direct from the Government experimental field conducted by this farmer on his property at Salisbury. The best paddock was 120 acres of Gallipoli 58, which should have yielded well, despite the presence of 15 to 20 acres of red patches. A proportion of these, however, had been treated with gypsum. 65 acres was ploughed in February and March, then spring-toothed in June, and in early August, scarified in September, and also part in October, and spring-toothed in November. In June the seed was "combined in" at the rate of 74 lb. per acre with 112 lb. super., and harrowed. The balance of the paddock was well worked winter-fallow, ploughed early in July, and sown similarly. The pickle used was copper carbonate.

Mr. A. Schultz's entry was the largest in the competition, comprising 449 acres. The high average yield obtained over this area is a tribute to his farming skill and to efficient management; but on such a large area it is scarcely possible to compete on even terms with competitors who may show only 150 acres or even less. Federation was the variety persevered with throughout, and on several paddocks the crop was very heavy. Points were deducted for the presence of weeds and for unevenness.

Details of Award.

Section 8—Highest Aggregate for—Whole of Fallow, 1923; Crop on the Fallow, 1924; Whole of Fallow, 1924; Crop on the Fallow, 1925.

Competitor.	Crop, 1925.					Total for Crop, 1925.	Total for—Fallow, 1923. Crop, 1924. Fallow, 1924.	Grand Aggregate.
	Yield.	Purity.	Absence of—		Evenness.			
			Weeds.	Disease.				
Possible points ..	**35**	**20**	**15**	**15**	**15**	**100**	**300**	**400**
R. Blackwood ..	35	19	13	11	12	90	279	369
W. E. Dahlenburg	23	19	12	12	12	78	279	357
E. G. Hoffman	27	19	11	11	10	78	258	336
C. F. H. Reichelt	27	18	13	13	14	85	242	327
A. Schultz ..	25	17	11	11	10	74	250	324

Section 9—Highest Aggregate for—Whole of Fallow, 1924; Crop on the Fallow, 1925

The competition extends over two years.

Mr. R. Blackwood was placed first—189 points out of 200; Messrs. F. K. Kluge and R. Blackwood, second—176 points out of 200; Mr. C. F. H. Reichelt, third—173 points out of 200.

The winner showed the same crops as those entered in Section 8, and Messrs. F. K. Kluge and R. Blackwood's entry was similar to that in

Section 8, with the addition of a paddock of 100 acres of land which had been out in grass for six years. This paddock—winter-fallow—had been thoroughly cultivated and liberally seeded and manured, but despite this, had been attacked by "takeall"—evidently existing on the grass stubbles.

Heavy Crop of Wheaten Hay at Mr C. F. H. Reichelt's, Woorak.

Details of Award.

Section 9—Highest Aggregate for—Whole of Fallow, 1924; Crop on the Fallow, 1925.

Competitor.	Variety.	Crop, 1925.				Evenness.	Total for—		Grand Aggregate.
		Yield.	Purity.	Absence of— Weeds.	Absence of— Disease.		Crop, 1925.	Fallow, 1924.	
Possible points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
R. Blackwood ..	Wannon, Imp., Gallipoli	35	19	13	11	12	90	99	189
R. Blackwood and F. Kluge	Wannon, Federation, Huff's Imp.	31	18	12	11	12	84	92	176
C. F. H. Reichelt ..	Federation, Wannon ..	27	18	13	14	14	86	87	173
W. E. Dahlenburg	Imp., Gallipoli, Federation, Wannon, Huff's Nizam	23	19	12	12	12	78	94	172
E. G. Hoffman ..	Federation	27	19	11	11	10	78	90	168
A. Schultz ..	Federation	25	17	11	11	10	74	91	165
J. and T. W. Rintoule	Federation, Wannon ..	27	16	10	11	11	75	90	165
G. H. Voight and Sons	Federation, Wannon ..	22	17	10	10	10	69	89	158

Section 10—Best Wheat Crop on Red Fallowed Land.

Two competitors having withdrawn, the prize was divided between the two remaining, namely:—

Mr. T. G. Marshall, first, 71 points; Mr. V. Collins, second, 58 points.

Details of Award.

Section 10—Best Wheat Crop on Red Fallow (not less than 75 Acres).

Competitor.	Variety.	Yield.	Purity.	Absence of—		Evenness.	Total.
				Weeds.	Disease.		
Possible points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**
T. G. Marshall ..	Federation ..	20	16	11	11	13	71
V. Collins ..	Huff's Imperial, Federation	11	17	10	10	10	58
C. P. Dahlenburg, Beacom Bros.	Withdrawn						

In conclusion, I desire to thank Members of the Society, and especially the Secretary, Mr. C. H. Towns, for their courteous assistance and hospitality extended during the work of judging.

SWAN HILL CROP AND FALLOW COMPETITION, 1925.

Report of the Judge, J. E. Harrison, B.Ag.Sc., Science Field Officer.

Swan Hill only recently organized Crop and Fallow Competitions, and a growing interest in them is becoming evident. The desire for the competitions arose out of an actual need. Situated some distance from the centre of agricultural education and progress, her farmers felt the want of knowledge of the most recent methods in the cultivation of wheat. As many districts will testify, competition is one of the best means of spreading a knowledge of up-to-date methods. Opinions are expressed and sifted, helpful advice is given and received, interest and effort are renewed and strengthened. While the broad general practice of agriculture is based everywhere on the same principles, each district has its own peculiar problems in the application of these. The principle of the conservation of moisture applies for instance in both the Wimmera and the Mallee, but the cultural operations necessary to mulch the surface soil differ in detail in both districts. Only by experience do we discover the cultural methods best suited to particular soils. In the same way we learn which wheat varieties are adapted to local conditions and may be grown with the greatest profit. As organized, the Crop and Fallow Competitions afford a means of promulgating a knowledge of successful methods and profitable varieties. In instituting the competitions, the Pastoral and Agricultural Society has followed a sound line of progress.

Details of Awards.

Section 1.—Best Crop of Wheat.

Name.	Variety.	Yield.	Type.	Weeds.	Disease.	Evenness.	Total.
Possible points ..	.. .. ..	35	20	15	15	15	100
Kent, W. H. ..	Joffre	25	19	14	14	14	86
Kelly, D. ..	Yandilla King ..	27	17	12	15	14	85
Watson, S. ..	Federation ..	25	18	13	15	14	85
Greenham and Sons	Penny	24	17	14	13	15	83
Garden, J. A. ..	Federation ..	24	17	14	13	15	83
Chisholm, D. ..	Rajah	24	19	15	10	15	83
Brydon, G. D. ..	Gallipoli 58, Wannon	21	19	13	14	15	82
Chisholm, D. ..	Gallipoli	21	20	13	13	14	81
Altman, A. ..	Corrowa	21	18	13	14	13	79
Algie, F. ..	Bald Early ..	24	20	13	5	15	77

Section 2.—Best Fallow.

Name.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible points	25	25	25	25	100
Kent, W. H.	21	24	23	24	92
Smith, jr., W. J. ..	21	24	21	25	91
Garden, J. A.	19	24	24	23	90
Newell, C. J.	18	23	24	24	89
Brydon, G. D.	17	23	24	22	86
Gordon, H. C.	16	25	24	21	86
Algie, F.	18	22	22	23	85
Stewart, H. G.	18	23	24	20	85
Watson, S. (Ex. A) ..	18	21	24	22	85
Chisholm, D.	18	23	22	21	84
Watson, S. (Ex. B) ..	18	21	25	20	84
Holland, J. T.	17	22	24	20	83
Altman, A.	16	21	23	20	80
Holland, O.	17	22	23	18	80
Sinclair, M.	16	23	21	20	80
Kelly, D.	16	21	22	20	79
Greenham and Sons ..	16	21	21	20	78

Comments on the Crops and Fallows.

The Crops.

In the crop competition, first place was awarded Mr. W. H. Kent with 86 points for an excellent crop of Joffre wheat, growing on a rising red loam. The preceding fallow had been ploughed in July, harrowed, cultivated twice before the end of the year, harrowed after rains in January, cultivated before drilling in the seed in May, and harrowed twice afterwards. 75 lb. of seed and 80 lb. of superphosphate were sown to the acre. The crop was heavy for the season. It was true to type, free from weeds, level and well headed, and practically free from disease. Importance was placed upon the freedom of the crop from weeds. Alongside it was another crop in which mustard was more or less plentiful. Mr. Kent explained that this one had been sown immediately after the rain, while the competition crop nad been sown

a week later when the weeds had shot, with the result that a clean crop was obtained. Mr. D. Kelly and Mr. S. Watson shared second place with 85 points each. Mr. Kelly exhibited an excellent crop of Yandilla King, growing on a rising loam. It was regarded as the heaviest crop inspected. The ears were bold and full, often 4 grains across. No disease was seen, but, unfortunately, the wheat was not true to type, and odd patches of mustard were noticed. The land had been fallowed in March, 1924, disced in July, harrowed in August, cultivated in October, disced the end of November, harrowed in February, 1925, sown in late April and early May, and harrowed. Sheep had grazed frequently on the fallow. 65 lb. of seed and 100 lb. of superphosphate to the acre were sown. Mr. Kelly believes in early sowing in the Mallee. He states that, though a few more weeds may make their appearance than with late sowing, the yields on the average are higher.

Mr. S. Watson's crop of Federation was likewise a splendid exhibit. It was sown with 52 lb. of seed and 75 lb. of manure the last week in

A Well-headed Crop of Federation (Mr. J. A. Garden's).

April. The land had been ploughed in July, 1924, harrowed, cultivated, and harrowed again before the end of the year. It was also harrowed in March of this year. Sheep had run on the fallow. The crop was heavy, fairly true to type, free from disease, fairly clean and even. Of the remaining crops, that exhibited by Mr. Garden deserves special mention. It was well headed and promised to make an excellent sample. Like all the crops mentioned previously, it had been sown early on a good fallow. A very clean crop of Rajah was entered by Mr. D. Chisholm, but, unfortunately, there was a percentage of ball smut present, in spite of the use of powdered copper carbonate as a pickle. In this connexion, growers are warned to use only reliable brands of copper carbonate compounds. Thoroughness in mixing the powder with the wheat is necessary to secure distribution of the fungicide over every grain. A crop known to have ball smut in it should not be harvested for seed. Selection of clean seed is the first precaution to take against the disease, pickling being an extra safeguard.

As a whole the crops exhibited were regarded as excellent for the season. Sound cropping principles are being followed by most growers. The advisability of later sowings is being tested with caution. Results this year confirm the practice of sowing in May as the most desirable. There is much possible improvement to be made in the quality of the crops, however, by a more careful selection of seed, particularly of seed true to type. Graded seed only should be sown, and the necessity of thorough pickling is again stressed.

THE FALLOWS.

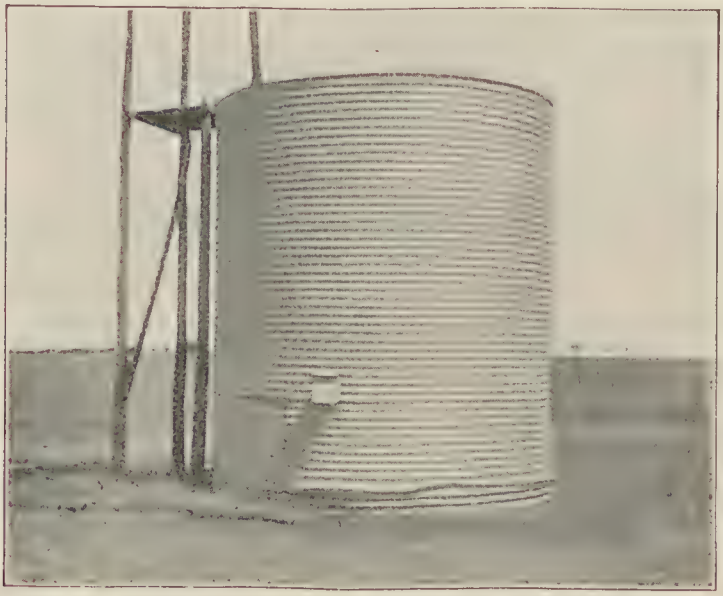
In the fallow competition Mr. W. H. Kent was also successful, securing first place with 92 points. The exhibit was outstanding in respect to moisture content, surface mulch, freedom from weeds, and cultivation given. In appearance the fallow, having been spring-toothed just before inspection, was nicely ridged, the mulch was fine, loose and dry, and only an odd weed was to be seen. Cultivation consisted of

A Solid Crop of Federation exhibited by Mr. S. Watson.

ploughing in July, harrowing and cultivating in August, and cultivating in September and November. Except for a small portion that had been cultivated rather early after rain and had a glazed appearance, the fallow had an excellent mulch from end to end. The soil was a red loam rising to a sandy ridge.

Mr. W. J. Smith, jun., who was awarded second place with 91 points, deserves special credit for the cultivation of his fallow. No fallow exhibited had been more thoroughly worked. Having lain idle for some time, the paddock was badly infested with onion weed when Mr. Smith took it over. After being ploughed in July with the mouldboard plough, the land was harrowed twice, spring-toothed in late August, late September, again in October, and harrowed finally. In spite of thorough and frequent workings, however, all the weeds had not been killed. When tall weeds, which have escaped the cultivator, are growing in a fallow a day is well spent in hoeing or hand-pulling them out by the roots. This often saves an extra and perhaps an otherwise unnecessary working.

A level attractive fallow was presented by Mr. J. A. Garden, for which he gained third place. Cultivation consisted of ploughing in June-July, harrowing down immediately, and working with the combine in late September and again in November. Mr. Garden had undoubtedly exercised good judgment in the time of using his implements. No fallow exhibited was in better condition for the number of workings given. Mr. Garden stated that he observed the fallow closely, and got to work on it just at the right time, when it was in good working order. This should always be recognized as important, and the best time to work is probably learnt more by observation and experience than by prescription. We consider land to be in good working condition when it is moist, friable, and easy to work. It should be neither dry and hard nor wet and sticky, but in a condition between the two. The high line content of most Mallee soils allows of cultivation on the wet side, and the farmer has time to cover large areas while the soil is still in good working order.



Grain Storage on the Farm of Mr. D. Chisholm.

There has been a tendency to extend the margin further each way, and some work the soil while it is wet, others when it is dry. Leading growers, however, are paying more attention to the time of working, for they recognize that skill and judgment are as essential here as in all other farm practices.

A weed know locally as Charlock, but which is the Hedge Mustard (*Sisymbrium orientale*) is more or less plentiful throughout the district. Like every weed of importance it competes successfully with the wheat crop and may reduce the yield by half. It is proving a very difficult weed to combat, and the success of any grower in securing a clean crop on infested land is important and should be recorded.

Mention is made elsewhere in this report of the success of Mr. Kent in securing a clean crop by not sowing until a week after rain. This lapse of time secures a good germination of the seed lying dormant in the surface soil, and the young plants are easily destroyed by cultivation.

This is indeed a good reason for not working the land immediately after rain unless the rain has lasted for some days, and weed seeds have had time to germinate.

In the opinion of many growers, cultivation "brings" the weed, and a consideration of the nature of the plant and the effect of the various cultural operations may explain this. Hedge Mustard bears numerous pods, each of which contains a large number of seeds, which are shed in December (about harvest time), and fall on the surface of the ground. Summer and autumn rains may germinate numbers of these, and they should be eaten down by sheep. When the land is ploughed, most of the remaining seed is buried a few inches deep in the soil, where it probably lies dormant, being too deep to germinate. Every scarifying, cultivating, and harrowing will bring some of these seeds to the surface and give them an opportunity to germinate. In this way, cultivation may "bring" the weed, and this is really what the grower should strive after. While the plant is very small and its leaves are still flat on the ground, a harrowing will root it out and destrov it. This of course, will bring more seed to the surface, and if rain falls, a fresh germination of weeds will take place, which must be destroyed by harrowing again. If the plants be allowed to grow an inch or more in height, it will be found necessary to spring-tooth the land in order to kill them.

It will be understood from these remarks that thorough cultivation of a fallow is all important in the destruction of weeds. Neglect allows the weeds to become established, while cultivation not only destroys them, but secures germination of a fresh lot of weed seeds and gives the grower an opportunity of finally clearing the land. When weeds are young and tender sheep will eat most of them, and where sheep are grazed on cultivated land there is every chance of securing a reasonably clean crop.

MANANGATANG FALLOW COMPETITION, 1926.

Report by J. Brake, B.Ag.Sc., Senior Inspector of Agriculture.

The judging of the fallows in the Manangatang district in connexion with the 1926 contests for the "Cloonan" and "Manangatang" Cups was carried out in the second week in February.

In common with the rest of the Mallee, the district experienced a very dry spring, and received practically no rain after September; consequently the fallows had been given fewer workings than would otherwise have been the case. The sandy soils had drifted a good deal, but generally contained moisture, whereas the heavier soils were of a better appearance, but contained practically no moisture.

The winning exhibit in the "Manangatang Cup" was that of Mr. P. J. Sharp, consisting of a long sandy rise. Although a certain amount of drift had occurred, the fallow showed evidence of good workmanship, and was well supplied with moisture. It was fallowed in April, twice harrowed, crossed with a Wimmera cultivator, then "combined," harrowed, "combined," and cross-harrowed.

Mr. C. Connell took second place with a very fine looking fallow of heavy red soil which should yield a fine crop if good rains are received; it scored well in all sections except moisture, which was very low.

The awards are as follows:—

Fallows—Manangatang Cup, 1926.

Name.	Mulch.	Moisture.	Absence of Weeds.	Cultivation.	Total.
Possible points	**25**	**25**	**25**	**25**	**100**
P. J. Sharp	23	22	21	21	87
C. Connell	23	16	24	22	85
L. W. Lambert	23	18	22	21	84
G. R. McCague	22	17	23	22	84
I. A. Sharp	22	17	22	20	81
A. D. Vanderfeen ..	21	17	22	20	80
R. Wharton	22	16	20	21	79
G. A. Glourey	21	16	20	21	78

In the "Cloonan Cup"—open to soldiers only—Mr. J. F. Thomas gained first place with 85 points, Mr. C. W. Ross, of Waitchie, being second with 84 points.

The winning fallow was ploughed with the mouldboard 3½ inches deep in July, harrowed and cross-harrowed, spring-toothed in August, scarified in September, then spring-toothed across, and finally spring-toothed in November in order that the paddock might be left in a ridgy state, with ridges running north and south so as to minimize drift. The awards are:—

Fallows—Cloonan Cup, 1926.

Name.	Mulch.	Moisture.	Absence of Weeds.	Cultivation.	Total.
Possible points	**25**	**25**	**25**	**25**	**100**
J. F. Thomas	23	19	22	21	85
C. W. Ross	23	18	22	21	84
M. McLeod	22	16	22	22	82
I. A. Sharp	22	17	22	20	81
H. W. Brown	20	19	21	21	81
J. Cullen	23	19	20	19	81
C. H. Fisher	20	16	24	20	80
M. Gray	20	19	21	19	79
S. R. Johnson	21	16	21	21	79
S. Warren	22	15	21	20	78
L. Molyneaux	21	16	20	20	77
J. Julian	20	15	19	20	74
T. S. Lambie	19	15	18	20	72

Although there were not many summer fallows exhibited, it was pleasing to see the number of paddocks in which cultivation had already been commenced for next year. The mere stirring of the surface is valuable in conserving what moisture there is present, and the loose surface is much more open to receive and hold the first rains.

My thanks are due to the gentlemen who drove me round in the course of the judging—Messrs. Amos, Wilkinson, J.P., McCague, and Waters.

SWAN HILL LUCERNE COMPETITION, 1926.

Report by L. C. Bartels, B. Ag. Sc., Senior Irrigation Officer.

Lucerne growing has been the basis of development of the Murray River flats at Swan Hill, and, when first sown, high yields were obtained. Some stands of lucerne on the Settlement are still of a very high character, but many of them are not, and do not reflect the productivity of the soil of the flats. Recently the Swan Hill Agricultural Society decided to hold a competition for the best growing crop of lucerne, and it is hoped that by studying the methods of the successful growers and broadcasting them the average production will be raised, and that the competitive element will be a stimulus to greater care. Judging by the results from crop competitions, no better means for fostering improved farming methods can be adopted. There are so many principles involved

A Swan Hill Lucerne Crop.

in lucerne growing under irrigation, and so much depends on the farmer himself that any means by which information can be spread regarding the best practices is to be encouraged.

The number of entries received for this, the first competition at Swan Hill, was disappointing, but the decision to have a competition was not arrived at till late in the season, and entrants were limited to members of the Society.

The exhibits were good and, what is of prime importance, an analysis of the growers' practices showed that the crops were the outcome of approved methods. The crops inspected gave ample evidence of the suitability of the flats for lucerne, and that the exhibitors had learned how to grow it, but a few observations relative to lucerne growing generally may be helpful.

Lucerne is normally a long-lived plant and a very productive one, and it deserves a good start. Land should be fallowed for months to produce a good seed bed of moderately fine tilth and free from weeds.

March or September are the best times to sow, and it would appear that at Swan Hill, Autumn sowing is the better. In cooler districts, the weight of evidence is in favour of spring sowing. From 8 to 12 lb. of seed per acre is recommended.

There is conclusive evidence from the Irrigation Investigation Committee's tests that phosphatic manure is an absolute necessity on the flats, and it would seem that the maintenance of yields depends on this factor more than on anything else. In some cases the quantity of water is not adequate for highest yields, but it is on the safe side. It is recommended that superphosphate be put in with the seed, and at least one annual top-dressing should be given afterwards—a bag per acre is a good application.

Weather conditions at Swan Hill generally make hay curing difficult. If it be practicable, the rake should follow the mower almost immediately. The hot drying winds may scorch the leaves and permit carting the day after cutting, but this dried lucerne is not cured hay. It is very desirable to save the leaves; but the drying should take place as slowly as possible under the hot, dry conditions so often experienced. Rake immediately after cutting, and hand-cock the hay.

Points Awarded.

Name of Competitor.	Apparent Yield at Time of Judging.	Quality of Hay which Crop would produce.	Uniformity of Stand.	Absence of Weeds.	Freedom from Disease.	Total.
Possible Points	**40**	**25**	**15**	**10**	**10**	**100**
J. A. Walker (B exhibit) ..	40	23	12	8	8	91
R. Spence	38	24	11	8	9	90
J. A. Walker (A exhibit) ..	40	21	12	8	7	88
J. A. Walker (C exhibit) ..	35	25	10	7	9	86

Comments on Competing Crops.

Mr. J. A. Walker presented three plots of lucerne for the competition. Exhibits "A" and "B" were in the second year of growth, and were on a reclaimed reed bed of the river flat. Considerable work was necessary in breaking up this land, and an oat crop was taken off first. When the oat crop was harvested the land was ploughed in preparation for sowing the land in the following spring. The crop was sown in October. Mr. Walker has had good results from spring sowing, but irrigation is necessary to germinate the seed, and weeds grow abundantly. Eight pounds of seed (Hunter River) was sown per acre—broadcast without manure. Cover crops are not favoured.

The paddocks on which the lucerne was grown have a flat grade; therefore not much grading was necessary; the earthwork and levelling was done with scoops. The bays were made 1 chain wide and 5 chains long.

It is Mr. Walker's practice to irrigate six weeks after germination of a new crop. Weeds are kept in check by mowing. He has not scarified his lucerne, but he thinks cultivation would improve it.

In September the paddocks were top dressed with a bag of super. per acre, but a portion of one of them left untreated looks equally well.

The fields have been lightly grazed in winter, but the stock have been kept off the ground when wet.

The lucerne is cut for hay when the new shoots are two inches high. The crop is mowed, raked into windrows and heaped with the rake. The hot weather in summer renders hay-making difficult. In hot weather the hay is carted two days after cutting, and in cooler weather three days. Mr. Walker irrigates after cutting, and six cuttings are made per season.

Exhibits "A" and "B" were both portions of a field of 23 acres. They were both uniform and free from weeds except in very small patches. At inspection the crop had been growing six weeks and was matured. It had flowered, but the flowers had dropped, apparently through the action of bean butterfly larvæ. The plant stalks were rather woody; the bottom leaves were dropping, and some of the leaves were spotted with rust.

"B" exhibit was not quite the same height as "A." Exhibit "C" was of shorter growth than either "A" or "B," having been cut three weeks previously; it was an older stand than "A" and "B" and was somewhat irregular, but the growing lucerne was of excellent quality.

Mr. Spence's lucerne presented a nice appearance, and was the fourth crop for the season. The plants were not far advanced in bloom and would yield good hay at that stage. There were very few weeds apparent, and very little leaf spot or other disease was observed. In places the stand was thin, and some little irregularities showed. In parts the checkbanks were bare, but the general uniformity of the area indicated that watering was even and treatment regular.

The paddock of lucerne of which the exhibit formed a part was on black Murray flat land, well drained, with a rather steep grade. It was sown in mid-summer, and at first was not very promising.

From Mr. Spence's experience he has decided that March sowing on well prepared land is the best for the Swan Hill flats. The young plants get established before winter, and the crop has not the same competition from weeds as a young spring-sown crop. Hunter River lucerne is liked, and a seeding of 10 to 12 lb. per acre is recommended. Mr. Spence broadcasts the seed after an application of manure, and he says that even in the first season another application of manure is warranted. A nurse crop is not favoured.

In Mr. Spence's opinion, if the lucerne is grazed and the soil compacted, cultivation becomes necessary; otherwise, unless there is a free development of grass, it is unnecessary.

On established lucerne superphosphate is applied at the rate of a bag per acre in the early spring. In the middle of the growing season another bag is given. The competition crop was on land which had also had a top dressing with gypsum from the Woorinen deposit, at 2½ tons per acre. Mr. Spence is assured that this has been very beneficial and has reduced cracking considerably.

The crop is cut when in half bloom, and if the weather is favorable it lies in the swathe for 24 hours; it is then raked and hand-cocked. The field is watered as soon as possible after cutting. Watering before cutting makes the ground too soft for machines, says Mr. Spence, for a period of 10 days. Over all this grower used about 18 inches of water per annum.

CHARLTON FALLOW COMPETITION, 1925-26.

Report by L. C. Bartels, B.Ag. Sc., Senior Irrigation Officer.

The fallows inspected at Charlton were spread over a wide range of country, and included a variety of soil types. To provide for this in the competition there were several sections, including black ground, red ground, mixed ground, and the whole area of farmers' fallows.

The lessons taught last year should remove any doubts as to the wisdom of careful working of fallow, but the recent long period of dry weather has not been favorable; therefore the condition of the exhibits, which were generally rather rough, with loose seed beds, did not reflect the real standard of farming practice amongst the competitors. Particularly does this refer to the intractable red soils, and mixed soils where patches of red ground and friable black ground are intermixed.

The objects of fallowing are generally well known. Primarily the object is moisture conservation, but the methods adopted for this achieve other objects as well; the soil is opened so that it will absorb as much rain as possible, and in the working of the fallows in spring the object should be to produce a covering of loose dry earth, which will interrupt the upward movement of soil moisture from particle to particle. If it gets to the surface it is readily dissipated under the drying influence of wind and sun. Naturally the deeper this surface mulch is the more effective it will be in preventing the escape of moisture; but experience teaches that wheat likes a firm seed bed, and so the working of the fallow must in part be directed to the preparation of this seed bed.

It is considered that in the friable soils of the Wimmera a covering of 2½ inches of loose soil on a firm under-layer is the desired end. An inspection of the fallow should reveal this bed as level and moist. Under the influence of warmth and moisture and air, micro-organisms are building up plant food, and elements of food become available in the soil solution; weeds will start and may be suppressed. The spores of disease such as take-all, flag smut, &c., will germinate, and in the absence of a host will die. If fallows are neglected and the moisture in the subsurface layer allowed to dry out, there will be a drain on the reserves of moisture below, the activities of beneficial germs will be retarded or stopped, weeds will develop to rob the moisture and plant food, and probably propagate disease; dry lumps on the surface will protect wild oats and other weed seeds.

Providing the fallow is maintained in good order, an extended period of fallow is better than a short one.

While the best condition may be obtained in practice on the friable soils of the district, the red soils present a problem. They are worked more deeply than the black soils, and the tendency is to leave them in a rough condition because of their liability to set.

It may be remarked here that at least two exceedingly rough fallows inspected had very moist subsoils, but underlying the lumps there was a depth of 4 inches of loose dry earth.

The ideal condition is the same for red and black soils, but because the maintenance of the mulch on the red soils is so difficult, a

compromise must be made between the ideal and what is practicable. The soil should be left with a knobby mulch, but not with big clods.

Differences in workmanship govern the condition of the red fallows. This was well evidenced during the inspection. Much depends on seizing the right time to cultivate them. Recourse is often made to the disc-cultivator, and the sundercut is being used to a large extent.

Attention is directed to the advice given for the use of gypsum or kopi on these refractory soils. This is the result of experience on experimental plots at Goroke and elsewhere. Some farmers met on the tour were disposed to try lime or gypsum. It should be understood that gypsum is not applied through the drill; from 10 cwt. to 1 ton per acre, or more, is needed, and it is applied broadcast with a spreader, or even with a shovel from a dray. Its effects should last for several years. It does not dispense with the need for superphosphate.

The members of the committee actively co-operated to facilitate the judging, and the arrangements of the secretary, Mr. Bennett, left nothing to be desired.

Details of Awards.

POINTS AWARDED.

Name of Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Possible points	**25**	**25**	**25**	**25**	**100**
75 Acres of Black Land.					
J. Bartlett	24½	23	23	23	93½
A. Blackwood	23½	23	25	22	93½
W. O'Connor	24½	22	24	22	92½
S. Perry	24	22	23	22	91
A. J. White	24½	21	24	21½	91
G. Cox	23½	22	23½	21½	90½
T. N. Judd	23	22	23	22	90
F. Edwards	22½	22	23	21½	89
75 Acres of Red Land.					
S. Adams	21½	23½	25	22	92
A. R. Blackwood ..	23½	22	24	22	91½
F. Judd	23	20½	24	21	88½
J. MacDonald and Sons ..	25	18	23	20	86
S. Perry	23	19	21	20	83
75 Acres of Mixed Ground.					
F. Judd	24	23	24	22	93
A. R. Blackwood ..	24	22	24	22½	92½
G. Cox	23½	21½	24	22	91
F. Edwards	23	22	23	22	90
D. Gillies	23	22	24	21	90
P. Carmody	23	21	23	22	89
T. N. Judd	22	19	21	20	82
Whole Area of Fallow—Not Less than 150 Acres.					
A. R. Blackwood ..	23½	22	24	22	91½
F. Edwards	24	21½	23	21½	90
A. J. White	24½	21	24	20½	90
S. Perry	23	21½	23	22½	90
G. Cox	23	21	24	21½	89½

Comments on the Fallows.

75 Acres Fallow on Black Land.

Mr. A. R. Blackwood's exhibit was on black land, which bore a crop of wheat in 1924. It was ploughed in March, 1925, with the set mouldboard plough, and harrowed in May. It was scarified at the beginning of August and harrowed twice. In September it was scarified. At the time of judging in March last, it presented a nice appearance with a mulch ridged as left by the scarifier six months previously; the seed bed showed slight ridges also. There was an entire absence of weeds.

Mr. J. Bartlett presented for inspection 75 acres of black ground—portion of a field of 115 acres. A self-sown crop was cut from this land in 1924, and soon after at the end of January it was disc-cultivated 3½ inches deep. It was subsequently spring-toothed twice and harrowed four times—the last harrowing being after rain in November. From then it was left untouched, and when judged had a nice appearance, although the presence of a few weeds and evidence of barley grass detracted from its quality. The seed bed was slightly ridged, but the mulch generally was of good depth and texture. Cracks were beginning to appear. The moisture content of the seed bed was good.

75 Acres Red Ground.

Mr. S. Adams showed an area of ground in the red fallow section which had been recently harrowed, and so had a good mulch except in patches where it was rough. The seed bed was fairly level, but the moisture content was apparently not very high. This ground had been skim-ploughed in July 3½ inches deep, harrowed in September, partly cultivated with spring cultivator at the end of November after rain, and harrowed in March.

Mr. Blackwood's exhibit of fallow in the red ground section was an area of 80 acres which had been ploughed in early July 4 inches deep with the set plough, and harrowed immediately afterwards; it was again harrowed in early August and scarified at the beginning of September. For a red paddock it presented a good appearance; the ridges on the surface were still preserved; the surface was loose to a depth of 4½ inches, and the seed bed was fairly level.

75 Acres of Mixed Ground.

Mr. F. Judd, at Teddywaddy, showed very nice-looking fallow in the mixed ground section. It had a mulch of the right texture, but was not as uniform in depth as desirable; the seed bed was uneven. The red portion of the area had been reduced to a nice condition; the surface was lumpy, but not too rough. The moisture content was relatively good, and there was very little weed growth. The undercut had been used to break this ground in March and April. It was spring-cultivated in July-August, harrowed in September, and spring-cultivated the same month. After rain in November it was harrowed.

Mr. Blackwood's mixed ground exhibit was in a field comprising two sections, in one of which the red ground preponderated and in the other the black ground. The northern half had been summer fallowed, the

undercut being used for breaking it. The southern half was ploughed in July with the set plough. The northern half had had two scarifyings and three harrowings, and the southern half one scarifying and three harrowings. In the red patches the surface was rather rough, but the moisture in the subsoil was good. The seed bed was ridged in places, but generally level. Odd barley grass plants still showed.

Five farmers submitted their whole areas of fallow for competition.

Mr. Blackwood, who showed some 265 acres, was considered to have the best. The workings of his land have been detailed in the different sections above, in all of which he was well placed, indicating the high standard which he maintained throughout.

Mr. F. Edwards used a stump-jump mouldboard plough throughout on his land. With the exception of the exhibit in the black ground section, which had been summer fallowed, the land had been ploughed in July, and the spring-tooth cultivator and harrows were used subsequently. A paddock of 320 acres included in the exhibit had a relatively high moisture content. This could not be attributed to the mulch, because the paddock was rough, but Mr. Edwards considered that it was due to the fact that there was a heavy stubble on this paddock from the crop of 1924, and it was not burnt till June. It covered the ground thickly, and would have an influence in conserving moisture.

Mr. Cox used the skim-plough, disc-cultivator, and stump-jump mouldboard plough for breaking the ground in different sections. The last-mentioned was used on an area of 100 acres recently cleared. For the subsequent workings the skim-plough, scarifier, and harrows were employed.

Mr. S. Perry, with an aggregate exhibit of some 750 acres, had some good sections, but portions were below the average. His red ground was very rough. One paddock of 320 acres was in fair condition, but it had some weeds and a reduced moisture content.

TREATMENT OF BURNS IN ANIMALS.

The following reply has been furnished by the Live Stock Division of the Department of Agriculture to a correspondent asking for directions regarding the treatment of stock burnt in bush fires:—

The burnt areas of the skin should be cleared of all burnt wool, dead hair or skin, as the case may be, by the use of shears or scissors—whichever is handiest. The exposed parts should then be washed carefully with a luke-warm solution of boracic acid or Condy's fluid, mopped dry gently with a clean piece of cheese cloth, and subsequently smeared with carron oil, which comprises a mixture of lime water and linseed oil, shaken well together, in equal parts. The lime water may be easily made by slaking two handfuls of lime in a small bucket of water, and allowing the sediment to settle down, when the clear lime water can be easily poured off. The dressing should be repeated on alternate days.

The worst results to be feared from burns are septicaemia, or blood poisoning from mortification of the flesh, or lockjaw from infection of the damaged tissues from soil, manure, &c.

PLUM AND PRUNE CULTURE.

By J. M. Ward, Superintendent of Horticulture.

(Continued from page 172.)

Pruning.

The pruning of the European plum (*Prunus domestica*) is becoming better understood by growers than was the case a few years ago.

Fig. 42.—Green Gage nearly 30 years old.

Hard pruned for several years, then allowed to go unpruned for about 10 years. Result very little fruit, nearly all the wood having become barren. Such treatment is wrong. The only fruit-buds on this tree are a few at the extreme ends of the branches.

Still, there are many fruit-growers who do not yet know how to prune a plum tree so as to obtain the best results. It is the practice of some growers to prune the plum in the same manner as they would prune certain varieties of apple trees—Yates or Sturmer, for instance—viz., by cutting away most of the laterals or shortening same back, with a view

Fig. 43.—Two-year-old Tree before pruning.

Fig. 44.—The same Tree as shown in Fig. 43 after pruning.

Fig. 45.—Three-year-old Angelina Burdett before pruning.

Fig. 46.—Three-year-old Angelina Burdett after pruning.

to forming permanent fruit spurs. This method results in the plum tree continuing to make excellent growth, but it will yield very little fruit. After a few years of this treatment the grower becomes dis-

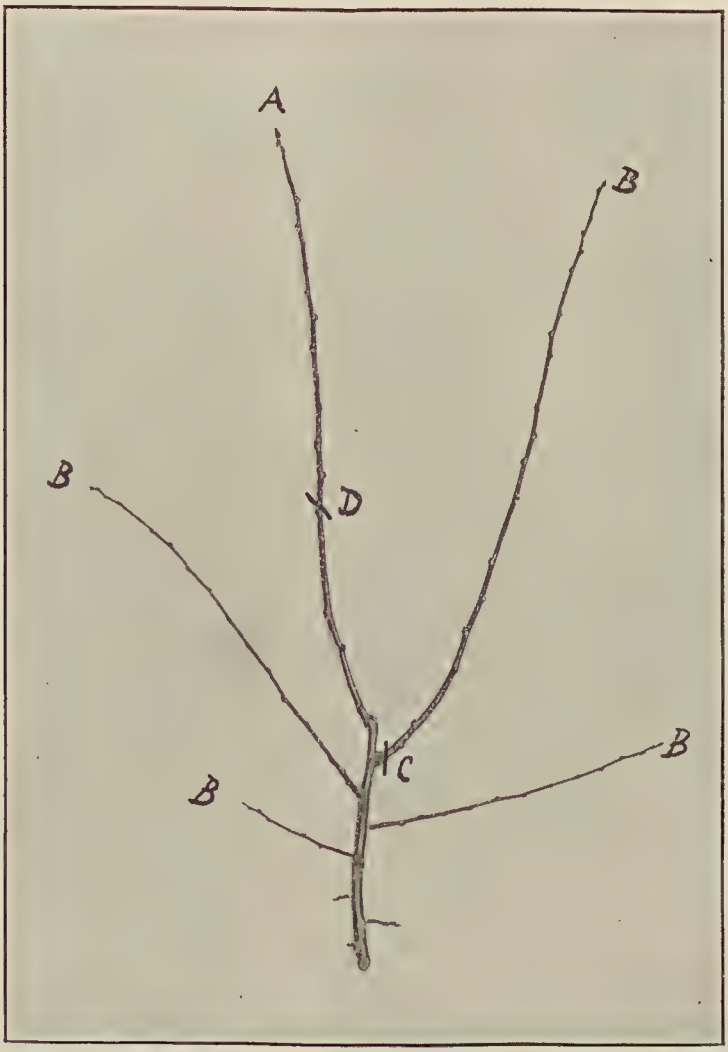


Fig. 47.—Top Portion of Main Arm of Five-year-old tree, showing Leader (a) and Laterals (b).

At this stage provision is made for a crop two years later. The leader is cut at (*d*), the strong lateral is cut at (*c*), and the remaining laterals are left uncut.

satisfied with the small yield, and arrives at the conclusion that pruning his plum trees does not pay, or may be he considers that plums do not require pruning. He therefore leaves them unpruned, with the result

that two years later the trees bear a heavy crop. The grower then feels certain he was perfectly justified in not pruning. The following year he finds he has another fairly good crop, but not quite so heavy as that of the previous year. Each succeeding season the crops gradually diminish, until there are only a few plums on the extreme ends of the branches, most of the wood being devoid of leaves and fruit buds. (See Fig. 42.) The grower becomes puzzled, and finally resolves that plum trees are not good croppers over a number of years, more especially the Golden Drop variety, and in some instances the trees will be grubbed out, or cut down and worked over to other varieties. The writer knows of several instances where this has occurred. In fact, in practically every fruit district where plums are grown, one can see trees that bear

Fig. 48.—Showing Fig. 47 after Pruning.

but nominal crops. With a little care and attention to the pruning, such trees could be brought into a productive condition again. This would, however, require a period of two to three years to accomplish.

The chief causes of the plum tree not bearing good average crops are usually either faulty pruning or lack of interpollination. Both faults can be overcome.

To describe pruning, a two-year-old tree (two years old from the bud) that has been planted one year, will be taken as an example. At this age the young tree should have from two to five strong growths, which are termed leaders. (See Fig. 43.) Let us suppose there are three. These are cut back to about the sixth or eighth bud (Fig. 44), not counting those three or four, known as the base buds, to be found at the "heel" of each leader. The following year (two years planted) each of these leaders should throw out two strong growths (sometimes more,

sometimes perhaps only one) and two or three weaker ones, say six strong growths or leaders from the previous year's three leaders. If the season be a dry one, the growth may be weak. Presuming the growth has been satisfactory, the weaker ones should be cut hard back to the base buds, and the leaders shortened back, leaving about 9 or 12 inches (or even

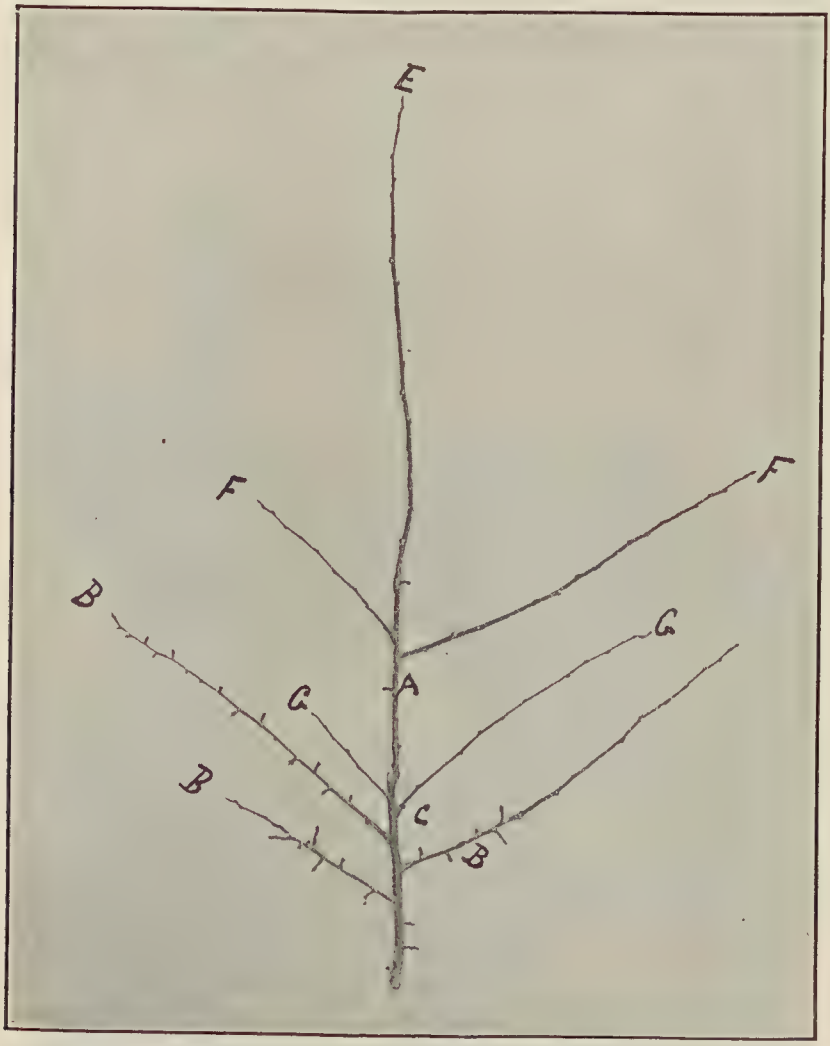


Fig. 49.—Showing Fig. 48 a year later.

It can be seen that the laterals (*b*) have produced fruit-spurs, whilst from the leader (*a*) another leader (*c*) and laterals (*f*) have grown. Two new laterals (*g*) have been produced from the base buds where the strong lateral (*c*) was cut the previous year.

more) of wood when well grown. If the tree has not made strong growth, it must be cut still further back. The following year (three years planted) there should be nine to twelve fairly strong leaders and other weaker growths. (See Figs. 45 and 46.) The leaders, if well placed,

Fig. 50.—Five-year-old Golden Drop Planted and Pruned by the Author.

The majority of the fruit is borne on two-year-old laterals which were cut out a few months after harvesting the fruit.

should be cut back, leaving from 12 to 18 inches of wood, according to growth. These leaders form the frame of the tree; the weaker ones, termed the laterals, should be treated by removing entirely about half

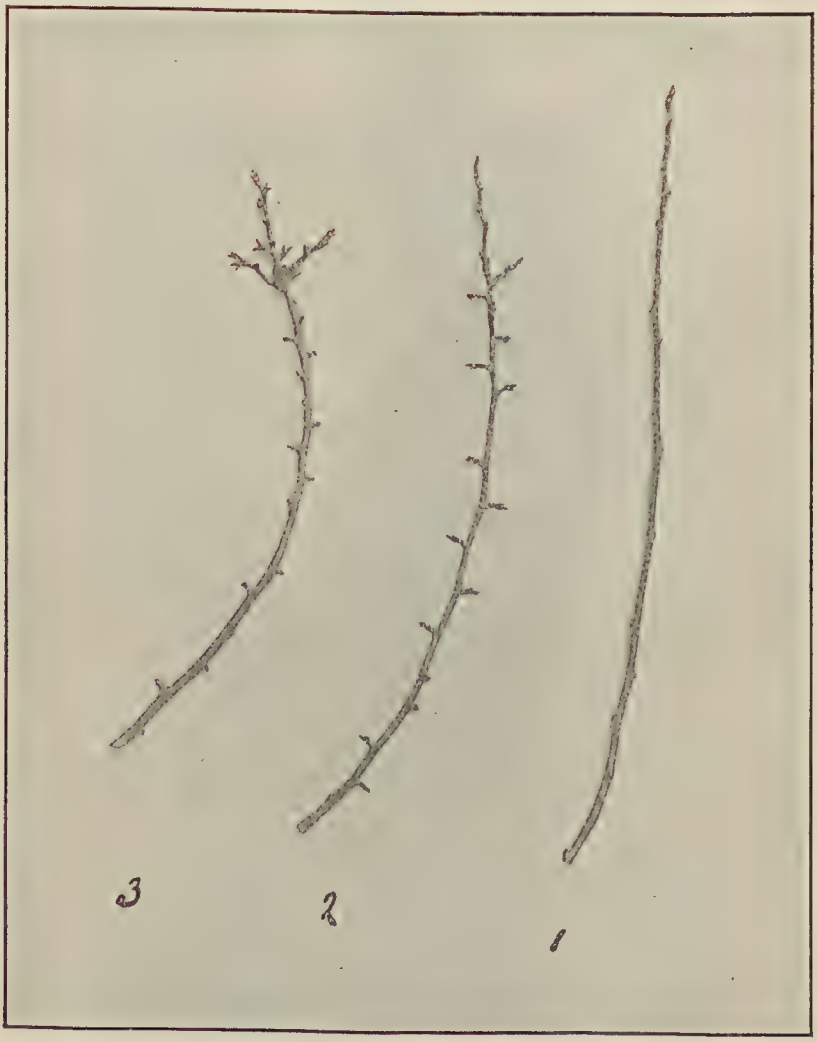


Fig. 51.

(1) A one-year-old lateral.

(2) Two-year-old lateral, showing how fruit-spurs develop from the bud when left unpruned for a year.

(3) Three-year-old wood after fruiting. Each spur has produced fruit and then died out. This class of wood will not fruit again except at the tip, and should, therefore, be cut out.

of them; the other half should be left uncut. (See Figs. 47, 48, 49.) At this stage provision should be made for the tree to crop at the fifth year from planting.

Fig. 52.—A Two-year-old Lateral Fruiting.

This should be cut out at the following winter pruning. New laterals will follow in its place.

Two years later, the tree having been then five years planted, should commence to yield good crops for its age. (See Fig. 50.) When each main arm has three, two, and one year old laterals or fruiting wood (see Fig. 51), the wood that has borne fruit should be cut out. The first fruit of any consequence will be borne on the uncut laterals. The buds of these laterals usually take one year to develop into fruit buds or small spurs; the following year they will fruit. Each spur upon these two-

Fig. 53.—Reine Claude de Bavay before Pruning.

year-old laterals will be from a quarter to 1 inch long, and will produce from one to three plums, occasionally more. (See Fig. 52.)

There are quite a number of fruit spurs along each of these two-year-old laterals, and it necessarily follows there should be a good yield of fruit the following season. After cropping, these small spurs in most cases die, and the old lateral becomes devoid of live buds to the point where the previous year's terminal bud existed, and will not again be

active. In the meantime this terminal bud has grown from a few inches to a foot in length, sometimes longer.

As before stated, the spurs that have borne fruit usually die, and no other buds will develop in their place; therefore, the whole of what was two years before a lateral should be cut out. Where the previous year's laterals were removed, others will have grown in their places. Whilst the laterals that were left in the tree have been developing fruit spurs, the base buds (or some of them) will have grown into new laterals, and these will develop fruit spurs while the former ones are fruiting,

Fig. 54.—Reine Claude de Bavay after Pruning.
Note number of laterals left uncut; also development of fruit spurs on main arms.

and will be in a fit condition to take the place of those which have borne fruit. All this time, of course, the tree has been growing and making great headway, and has made more leaders and laterals. The later laterals should be cut out to the extent of one-half, the remaining half must not be touched. Where there are, say, 20 laterals, remove ten and leave ten. (See Figs. 53, 54, 55, and 56.) This must not be regarded as a hard and fast rule, as no definite rule can be laid down in regard to pruning, but it can be taken as a guide in treating the laterals until one becomes an accomplished pruner; he can then use his

own judgment, based upon experience. The laterals left in the tree will, in turn, replace those that have fruited. This goes on year by year, and by cutting away those which have fruited, provision is made for others to grow. Never leave in the tree wood or laterals that have fruited and become barren, as shown in Fig. 51 (3). Where one is cut away another will usually appear the following year, but not always in the

Fig. 55.—Prune d'Agen berore Pruning.

same place. In addition to using laterals for fruiting purposes, spurs from a few inches to about a foot in length will appear on the main arms and elsewhere. (See Fig. 57.)

These growths usually last a number of years as fruit spurs, more so in some varieties than in others. As they become too long and have

only a few fruit buds at the tip, they should be taken out, and others will replace them. There are always dormant buds, which can be brought into activity by cutting out the used wood, thus causing them to develop into useful fruiting wood. As the tree becomes matured, the leaders should be cut back, leaving about 9 inches of wood; in carrying out this operation, one will have to be guided by the growth made. On some varieties one-year-old wood will bear fruit; this especially applies to the Japanese type of plum. Generally speaking, the

Fig. 56.—Prune d'Agen after Pruning.

This variety does not send out spurs on the main arm to the same extent as certain other varieties; this is the reason for the greater number of uncut laterals. (Compare with Fig. 54.)

orchardist must look to two-year-old wood for most of his crop. This is the reason for cutting away the laterals that have borne fruit, and inducing young wood to replace them. The pruner must have three years' crops in mind when pruning.

It should not be forgotten that some varieties of plums are inclined to make fruit spurs to a much greater extent than others; these spurs usually continue to bear fruit for a number of years. When they

become too long or worn out, they must be entirely disposed of, or if a good bud can be seen near the base, they should be cut back to it. Provision should be made for a supply of growth around the trunk of the tree as it becomes aged; this growth serves a double purpose—it will shade the tree from the hot glare of the sun, and will provide useful fruiting wood. If the trunk and main arms of the tree are exposed too much, sunscald results, which, in course of time, proves to be detrimental

Fig. 57.—Fruit-spur, Five to Six years old, was one time a Short Lateral.

The terminal and another bud developed into fruiting spurs. Such wood as this will fruit for a number of years.

to the tree. The foregoing remarks on pruning apply principally to the European varieties of plums; the Japanese type (*Prunus triflora*) can be similarly treated with equally good results. At the same time, it should be mentioned that many of these kinds of plum fruit freely on new wood as well as on the two and three year old wood; usually, however, three-year-old wood should be removed, unless it is required as part of the frame-work of the tree, that is, one should depend mainly upon one and two year old wood, and short fruiting spurs, for the crop, and

Fig. 58.—Coe's Late Red (Sydney Late), 6 Years Old, carrying a Two Bushel Crop Pruned on the system herein advocated.

Fig. 59.—The same Tree as shown in Fig. 58 one year later.

Fig. 60.—Prune d'Agen Trees in Bloom. Wagga Experiment Farm Orchard.

Fig. 61.—A matured "Golden Drop" which, owing to Unskilled Pruning, had become barren of Fruiting Wood.

Such wood was later entirely cut out, new growth taking its place, resulting in the splendid showing of fruiting laterals, as shown above, two years after cutting out the barren wood. It will be necessary to remove practically all the fruit-carrying wood during the next dormant season.

not upon wood older than two years. When removing old or worn-out wood it should be cut hard back to the base, for it rarely throws forth new growth elsewhere than from or below the base.

It will be found by the experienced plum or prune grower that many matured prune trees develop the habit of fruiting on old wood and short spurs; in these circumstances a variation in the pruning system must be adopted. The average plum-grower can, with beneficial results to himself, adopt the general system of pruning herein advocated, and vary it in accordance with the conditions of soil and climate

Fig. 62.—The Incorrect System of Pruning a Plum Tree.

Note how all the laterals have been cut back; these will send forth dense growth the following summer; fruiting buds, however, will not develop to any extent.

prevailing in his district. In the northern irrigated districts lighter pruning may be necessary, whereas in the southern and north-eastern districts of Victoria, where the grower depends upon the rainfall, it may be wise to prune a little harder.

To become a competent pruner, one must study the growth, fruiting habit, and peculiarity of each variety of plum, and should understand the results that will follow from each cut.

(To be continued.)

THE CULL COW.

By W. J. Yuill, Senior Dairy Supervisor.

In the early stages of the District Herd Testing Association work certain questions were deferred, but with the rapid development of the movement it is essential that some of them be now discussed. One of these questions relates to the "cull cow," or "dud cow," as she is sometimes termed. The term when used in its widest sense is made to apply to a cow culled from a dairyman's herd owing to her inefficiency as a milk producer, or for any other reason that makes her an undesirable member of a herd.

At one time there were only two classes of animals in an average herd: i.e., cows and heifers, and a common saying in the past was that three heifers would produce as much as two cows.

The Association records show that there are many two-year-old heifers producing above the average of the herd to which they belong, and that the average two-year-old heifer in some Associations is producing more than the average cow of the State.

Herd Testing Association members offer to fix the value of an animal according to her production in comparison with the average of her herd mates of similar age.

Values can be appraised according to the known definite production, and allowances made for age, accident, disease, or any other factor.

Without the Herd Test Record much is supposition, particularly where large herds are hand-milked, or where the herd is being machine-milked, especially where all the milk of a herd goes up the same pipe, as is the case with overhead releaser systems.

Herd Test Records are a Sure Guide for Culling Purposes.

Any dairy farmer can ascertain what his herd average has been for the year in lbs. of butter fat or pounds of money. The butter factory manager can supply this information. Many dairy farmers keep a strict account of all cream sold, and can turn back the ledger year after year, and compare month with month. But this knowledge does not supply any evidence regarding the producing ability of the individual members of the herd. With the Herd Test Records, authentic information takes the place of supposition. Each animal is known as an individual, and her record is shown month by month. Therefore, a true comparison can be made, and after all factors have been considered, the low producers can be "culled."

Prettiness may have a value in the sale ring, but hard-headed, sound-thinking members of Associations now demand that it must be associated with profitable production, and they accept the known records of production as a guide to value.

A cow's total production of butter-fact is the factor that counts; it is the factor of value—not high test, nor heavy gallon yield. It is quite possible to have a "cull" whose test is high, or whose milk yield is heavy.

Herd Testing Association members are now expecting mature cows to produce from 250 to 300 lb. butter fat in a lactation period of 273 days. One cow may produce 3,000 lb. of milk, with an average test of

7 per cent., which equals 210 lb. of butter fat; another 6,000 lb. with a 3.5 per cent. test; the return of butter fat from the latter cow would also be 210 lb. The same difference in test and quantity may occur in a herd, under identical conditions, where the average production of the herd is even 100 lb. higher per cow than that of the cows just referred to.

There are now approximately 40 Herd Testing Associations in Victoria, treating about 30,000 cows, and during the next few years many low-producing and inefficient dairy cows will be "culled."

Undoubtedly a great improvement in production could be brought about by better feeding systems. This is evident from the quantity of butter exported in a good season as compared with a normal one; for instance—

The value of the total butter production of Victoria during 1923-4 was £86,888,723;

The value of the total butter production of Victoria during 1924-5 was £101,264,110.

As the number of cows being milked was about the same, feeding must account for the difference.

Evidence is not wanting to show that in some instances an increase of 50 lb. butter fat per cow was obtained from culling and breeding. This was achieved in a period of four years in Mr. Black's herds at Tarwin Lower, by culling the known low producers, and filling their places with two-year-old heifers bred from the best cows.

Known "Culls" should be Spayed.

In three small districts where several Associations are operating, over 2,000 cows have been spayed during the last two years. The Herd Testing movement has therefore not only indicated the best milk-producing cows, but has also been the means of relieving the industry of many potential sources of low production by limiting (to some extent, at any rate), dairy herds to the daughters of known profitable cows.

What is a "Cull" Cow?

This question may be answered in various ways. Knowing the average production for the State, it is not a difficult matter to set a minimum standard for the whole of the State for purposes of "culling." The individual dairy farmer, after comparing the records of the best cows in the State and those of his own herd, must set a standard for himself—a standard that, of course, must vary with the ages of his cows.

One of the conditions regulating the granting of the subsidy to a Herd Testing Association is—"Every member undertakes to effect, and does effect, the culling from the herd of all cows which, having reached the age of six years, have failed in each of two successive lactation periods to produce 175 lb. of butter fat."

To dairy farmers with a high-producing herd this standard would appear at the first glance to be too low, but it must be remembered that there are many dairymen now seriously setting to the task of improving very low-producing herds. Again, dairying is being carried on in this State under widely varying conditions, as, for instance, on the steep hill country of South Gippsland, and in some places under

dry conditions, without irrigation; in each case a short season results from natural causes.

In some of the hill country of South Gippsland £50 worth of land will carry a cow throughout the year. Therefore lower production will be more remunerative on these farms than on river flats where from £80 to £120 worth of land is required to carry a cow.

While it is necessary to set an arbitrary minimum standard for culling purposes, the very nature of the work drives a progressive man forward to a higher self-set standard.

Already there are many dairy farmers who are "culling" all mature cows that fail to produce 250 lb. of butter fat in nine months. Others have fixed their standard for mature cows at 300 lb. of butter fat per cow for the test period, while some men now demand that the average for the whole herd be 300 lb. for the 273 days' test period. A few keener men have a standard of 350 lb. of butter fat per cow, and here and there one finds men whose average is 400 lb. of butter fat per cow and over.

This keenness must make available some "culled" cows that will actually be good foundation cows for those with low-producing herds, for it may be that a cow culled from a highly developed herd is equal to the best cows in a herd where the task of casting out the "duffers" has just commenced.

A cow may fail to reach a set standard on a poor farm, yet easily surpass it on a good farm, but one need not qualify in any way the statement that a "dud" cow on a good farm will be a "dud" anywhere. The fact remains, however, that any mature cow failing to produce under normal conditions 175 lb. of butter fat in 273 days is a dairy cow in name only, particularly if that low standard be not attained during two years in succession. This is only equal to two-thirds of a lb. of butter fat a day. Many dairy herds will average this amount in six months, while large numbers of dairy cows will average 1 lb. per day for the full test period of 273 days.

In some herds the two-year-old heifers are averaging considerably over 200 lb. of butter fat in nine months, while many individuals are producing up to 300 lb.

The average production of the best three two-year-old heifers in five Associations during last season was 6,526 lb. of milk, yielding 325 lb. of butter fat. Mr. H. Howlett's "Dairymaid," an exceptional heifer, produced on a ration 8,992 lb. of milk, testing 5.27 per cent. = 473 lb. of butter fat.

In the annual report of the New Zealand Herd Testing Association for 1924-5 some very striking figures occur. In all, 58,308 cows were under test. Of this number, 22,034 produced less than 200 lb. of butter fat, while 25,399 produced between 200 and 300 lb. in the nine months. Of the 1,237 herds that were tested, six produced less than 100 lb. of butter fat per cow for the testing period.

It would probably be a great shock to most people if the number of cows in Victoria failing to produce 100 lb. of butter fat per annum could be stated. There undoubtedly are many such cows, and possibly a few herds, whose average falls below this figure.

Recent investigations in America into the feeding of 97 Association herds showed that the cost of feeding 2,000 cows, yielding an average of 154 lb. butter fat, was 1s. 1½d. for each lb. produced. The cost of

feeding 1,635 others, whose production averaged 347 lb. butter fat, was only 9d. for each lb. produced, while 7½d. per lb. was the feeding cost when the average production was 493 lb.

The figures quoted represent the cost of feeding; only the amounts earned beyond these figures are available to meet other costs and for profit.

Points to consider when Culling the Herd.

Many cows lose a quarter of the udder through chill, accident, or overstocking, and are still capable of producing over 300 lb. of butter fat in a lactation period, while under similar conditions sound mature cows, but naturally poor milkers, will fail to produce much over the 200 lb. mark.

Many fine old cows are now being retained in some herds because of their known persistent production and known value as breeders. In the past it was a common practice to cull all old cows and cows that had lost a quarter, irrespective of whether the cause had been accident, chill, or disease.

Many dairymen in the pure breed testing work are restricting their herds to certain families which have proved to be "dominant" in dairy character, and owners of grade herds are doing likewise.

There are many disabilities which prevent cows producing the amount of butter fat they would be really capable of yielding in normal conditions. A known good cow may fail by as much as 100 lb. owing to an attack of mastitis, footrot, calving trouble, retained placenta, fodder poisoning, digestive troubles, or chills. Any of these complaints may so affect an animal that she will be a "stale" cow for the remainder of the season, yet when calving again under normal conditions she may be among the best in the herd.

Cows that have not been dried off for a few weeks prior to calving and cows that calve too late in the season rarely do themselves justice. This is particularly true of those dependent to a large extent on spring pasture. While it is useless to have the herd calving early if adequate supplies of fodder are not available, it is definitely certain that "late-in" cows usually dry off as quickly as the "early-in" cows if succulent green feeding is not available.

There are many cows satisfactory as milkers, but possessing one or more of the many vices which may be found in any dairy herd, as "fencers" that are ever likely to have cut teats; kickers; cows that horn the more timid ones in gateways and milkings yards. Then there are others that bloat readily on clover or lucerne, and some that "hold" their milk.

Such animals, together with those whose appearance indicates that their future yields will be better than those of the past season, are soon valued according to their known production.

There are many other troubles which beset the path of the progressive dairy farmer, such as an outbreak of contagious abortion, mammitis, sterility, &c. Then there are fire, drought, and floods, any of which may interfere with the even running of a dairy farm.

But it will quickly be realized that the true dairy cow is a producer under all conditions. The better the feeding, the greater will be the difference in production when the real dairy cow is compared with those animals that are such in name only.

Branding "Culled" Cows.

Even since the beginning of the District Herd Testing Association movement, and more particularly since the Government has made available a sum of money to subsidize the work, there has been an incessant clamour for the compulsory branding of all "culled" cows. This has been more marked in those districts where the dairy farmers lack sufficient interest in their own welfare to attempt anything so progressive as investing in a well-bred dairy sire, or the formation of a District Herd Testing Association.

What has been written in this article will go to show that the definition of a "cull" cow is by no means an easy matter. It is quite possible for a cow to be regarded as a cull in one year because of her failure to reach a set standard of production, yet in the following year she may exceed it by from 50 to 100 lb.

Many recommend the branding of those cows surpassing the standard, but the same disadvantage exists, for a cow might be permanently branded as a "standard cow," and yet fail to reach the necessary standard when some of the disabilities already mentioned are present. This system, however, has the advantage of showing that such an animal was capable of producing the set standard under normal conditions.

In the writer's opinion, there is only one suitable mark for proved "cull" cows to carry, and that is the mark of the spayer's knife.

This matter has received the consideration of the Department of Agriculture, and has also been dealt with by the Council of the United Associations. It has been deemed advisable to allow the matter to stand over for more mature consideration. This question, among others, will be discussed at the next annual meeting of the Victorian United Herd Testing Associations.

Of the various systems now under consideration the one most favoured is the marking of every cow that passes through the Association. A system of marking or branding is suggested that will make it impossible to confuse any one animal with another.

Descriptive Marking as a Guide.

Descriptions of dairy cows are often misleading, more particularly with the broken-coloured breeds, such as Ayrshires and Friesians and broken-coloured Jerseys or Guernseys. Ear marks and the turn of the horns cannot be relied upon. In the case of identification photographs, one of each side of an animal is required. With whole-coloured animals, such as Red Polls or Red or White Shorthorns very little help is given by descriptions of markings.

What is possible in pure-breed work is difficult to apply to a movement which already is covering over 30,000 dairy cows, many herds being considerably over 100 head. In some districts dehorning is extensively practised.

It is not an uncommon thing to find different owners branding their stock with a similar brand, sometimes branding on the same part of the beast. Names are useless, for they may belong to any animal.

Under these conditions it is possible to find a number of cows in the same herd answering to the same description, as for instance, "Brown's herd of Jerseys, whole colour, dehorned, B on right rump."

With the system suggested below three brands or marks would be used as follows:—

(1) A registered mark for the Association.
(2) A number for each herd in the Association.
(3) A number for each cow in the herd.

The first and second mark would appear on the neck of the animal, which is covered by the least valuable part of the hide, while the number of the animal could be placed on the loin, or rump, according to the convenience of the owner or tester.

In large herds the system of numbering is preferred to names, and is already in use.

In the illustration below the brand X27 appears on the right neck, and on the right rump the cow's number. This clearly shows the animal to be No. 98 cow in No. 27 herd in that Association whose registered mark is X. It will quickly be seen that these three markings will not occur on any other cow in the movement, and are, therefore, a truer description than any markings of colour that she may have.

Each card of production will carry these marks, as will also the Association Herd Register.

It would not be long before any such system would be well known throughout all dairying districts, and any dairy farmer purchasing an animal with the Association marks on her—and without her card—would know that he was purchasing a potential "cull," for if she were a good cow the owner would produce her record card, and sell her on her production record.

It may be contended that if all "cull" cows were spayed or fattened any such system would be unnecessary. But this is not so, for there will be numbers of cows for sale producing well above the Government set standard, yet below the standard set by progressive men, who are getting rid of them so that their place may be given to heifers. In addition, cows that have been certificated in a test are sometimes sold at clearing sales.

The Herd Testing Associations quite realize their obligation with regard to the "cull" cow, and will evolve a means of dealing with her, for they know the necessity for better dairy cows to make the industry a more profitable business.

But it is pertinent to ask, Are the breeders of low-producing pure-bred animals doing their part? And again, Are those dairy farmers who clamour for Herd Testing Association members to effectively deal with their "cull" cows, are they as keen in safeguarding the interests of the public when culling their herds?

Of the Association members it can be said that they are in a position to know which cows to cull. Although, unfortunately, sometimes owing to accident or disease, it is necessary to cull from the top of the herd, the value of the progeny of such animals is definitely known, and later they will take their place in the herd.

But the cow that fails to reach the standard of 175 lb. butter fat in 273 days after two years' trial must go to the butcher or else to the spayer. Expert men will spay cows for from 2s. to 4s. a head, and dealers pay more for this class of animal, knowing that they fatten readily.

In this way the Herd Test Association movement is helping to relieve the industry of the "cull" cow that for so long has been an incubus on the industry.

ORCHARD AND GARDEN NOTES.

The Orchard.

E. E. Pescott, F.L.S., Pomologist.

As soon as the fruit is off the trees, the land should be well ploughed and left in a rough condition until the spring ploughing. If not already done, and the orchard conditions demand it, there is still time to put in a leguminous crop for green manuring purposes. But this should be done as early as possible, so as to give the crop a chance to make some good early growth. Soils deficient in lime or in organic matter are always benefited by a crop of green manures. Where stable manure is unprocurable, the green manure crop is the only means of adding organic matter to the soil.

Pests and Diseases.

All second-hand and old cases should be thoroughly overhauled. It is preferable to do this work now, instead of leaving it till spring, when the rush of other duties will certainly prevent it being carried out. The cases, if not bad enough to be destroyed by fire, should be dipped for some time in boiling water. And this is not only for the killing of the codlin larvæ, but also to destroy larvæ or eggs of any scale or aphis, and also any spores of fungus diseases that may have found lodgment therein.

As soon as the trees have shed their foliage they may be sprayed with lime sulphur spray for woolly aphis, peach aphis, and the bryobia mite. And this should be done before pruning, so that in handling and carrying the prunings the pests will not be spread about the orchard to infect the clean portions.

In areas where Fruit Fly is suspected, a strict watch should be kept for perforated or infested fruit, all of which should be destroyed by boiling for forty minutes.

The Flower Garden.

Bulbs, tubers, and corms of spring-flowering plants should now all be planted. As they appear above ground, they should be protected from the ravages of snails and slugs, as these pests have a very great liking for these succulent growths. A good surface dressing of broken leaf or dust tobacco will effectually deal with these pests. In fact, the gardener who constantly uses tobacco, either in the leaf, stem, or dust forms, will very soon be in the happy position that slugs and snails will cause him no anxiety whatever. Besides, the tobacco has manurial properties which are also valuable.

Pansy and any other seedlings, also rooted layers and cuttings, may now be planted out into their permanent positions.

Sowings may also be made of any hardy annuals, such as antirrhinum, aquilegia, correopsis, Canterbury bell, dianthus, everlastings, foxglove, gaillardia, hollyhock, larkspur, leptosyne, lobelia, marigold, pansy, petunia, stock, sweet peas, verbena, wallflower, and primula.

The Vegetable Garden.

There should now be no untidy or undug beds in the kitchen garden. The vacant beds should all be well dug over and prepared for the planting of vegetables for use in spring. In digging, a top dressing of manure should be given; this may be dug in. All weeds, too, may be forked into the trenches, and covered well with soil as each spit or length is dug. A dressing of lime is very beneficial at this time of the year three or four weeks after the manure or weed dressing.

A start should now be made at cleaning out the asparagus beds. This vegetable is most popular, and yet one rarely met with in ordinary household gardens. It is supposed to be difficult to grow, but this supposition is not borne out, as, once established, a bed of asparagus is one of the most easily managed plots in the whole garden. Depth of good soil and plenty of manure are all that this plant requires.

In establishing a new bed, it is advisable to see that there is a good depth of 2 or 3 feet of rich, well-manured soil. If this is not present, the soil should be dug out to that depth, and thoroughly mixed and enriched with well-rotted manure before being replaced. A bed deeply prepared, and supplied with ample quantities of manure, should last without replanting for very many years. The young plants or crowns should then be planted in trenches, keeping the rows 2 or 3 feet apart. An asparagus bed requires ample and direct exposure to the full rays of the sun. The asparagus should not be cut during the first season after planting; in fact, it is better to allow it to go uncut for two seasons. As little foreign weed growth as possible should be allowed in the beds, but, when they are not producing culinary asparagus, rows of lettuce, beans, radish, &c., may be grown between the crowns.

Towards the end of April the tops may be cut down, the beds cleaned, and a good top dressing of stable manure given. Chemical fertilizers, such as bonedust, sulphate of ammonia, and sulphate of potash, may be given as a substitute to organic manure. In the past it has been the custom to annually top-dress the beds with salt. It was supposed that, as asparagus in its native habitat was usually found in sandy soils near the sea coast, the plant required salt or a saline soil to produce successful results. It has been found, however, that salt is not at all essential to

good growth, and that the plant will readily adapt itself and grow well in soils of not at all a saline character. Where potash has taken the place of salt, quite improved results followed.

Seeds of onion, turnip, cabbage, cauliflower, carrot, and parsnip may now be sown.

REMINDERS FOR MAY.

LIVE STOCK.

Horses.—Those stabled can be fed liberally. Those doing fast or heavy work should be clipped; if not wholly, then trace high. Those not rugged on coming into the stable at night should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Old horses and weaned foals should be given crushed oats. Grass-fed working horses should be given hay or straw, if there is no old grass, to counteract the purging effects of the young growth. Attend to teeth and feet of horses to be turned out for the winter.

Cattle.—Cows, if not housed, should be rugged. Rugs should be removed in the daytime when the shade temperature is above 60 degrees. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Cows about to calve, if over fat, should be put into a paddock in which the feed is not too abundant. Calves should be kept in warm dry shed. Observe strict cleanliness in feeding to avoid losses and sickness incidental to calf-rearing.

All cattle should be provided with a lick consisting of 20 lb. salt, 20 lb. bone meal, 20 lb. slaked lime, and ½ lb. sulphate of iron.

Pigs.—Sows not already served should be put to the boar. Supply all pigs with plenty of bedding, and see that sties are warm and well ventilated. Supply sows liberally with grain. Castrate young boars as early as possible. Pigs should be highly profitable now, as pork is very dear. Rape, barley (especially skinless), oats, &c., may be sown for grazing during winter. Pigs should be supplied with plenty of charcoal and bone meal. Crushed barley will be the most economical feed for pigs at present prices.

Sheep.—Lambing is in full swing during the month of May—particularly in the warmer districts. Ewes should be kept in strong condition—neither too fat nor excessively fat. When the lambs are dropping, the most liberal treatment possible so far as concerns feed, shelter, and general attention pays; this care should be continued until the lambs are weaned.

Self-preservation being such a very strong factor in nature, it follows that badly-fed ewes will make bad mothers. Very old or very young ewes, if underfed, are usually very neglectful of their new-born lambs.

Late April and early May lambs may be marked towards the end of May. This work should be done in fine weather, and, if possible, most of the marking should be completed by, say, 3 p.m., so as to allow the lambs to mother before the evening sets in. It is advisable to yard lambs with their mother the night before marking, so that the work will not be undertaken when the lambs are overheated. A rest after the operation is also advisable to permit of a lessening of the blood-flow from the wounds before travelling. Every precaution must be taken to prevent deaths from tetanus or lockjaw, or from blood poisoning, which troubles frequently occur as a result of docking lambs in filthy yards, and from using filthy instruments. Before commencing, all knives, pliers, &c., should be thoroughly cleansed and disinfected in a solution of one part carbolic acid to twenty parts of water; they should also be frequently disinfected while in use.

Most flock-owners are agreed that the purse of male lambs should be drawn tight by the fingers, and the end completely severed. Slitting the purse is far too tedious, and is not recommended in any circumstances. In tailing, never draw tails tight, as the projecting bone will delay healing; particularly so if hot blades are used. Even when the cutting is done with a knife, enough loose skin should be left to cover the bone and veins so as to check the strong flow of blood which usually occurs in lambs of well-fed mothers. Losses should be avoided in every possible way.

If not already done, sheep should now be crutched, as the young grass of May tends to cause scour. Wool-blindness in fine-wooled sheep may now need attention. In wet districts, dry paddocks should be used to the full extent. A sharp look-out must be kept for such pests as foxes, rabbits, eagles, dogs, &c.

Poultry.—Feed animal food to forward pullets, about ½ oz. daily, and equal parts heavy oats and broken maize at night. Add lucerne chaff to mash daily. See that fowl houses are free from draughts to avoid colds, also that they are free from red mites. Use Epsom salts and sulphur once a week to avoid Roup and Chicken Pox.

CULTIVATION.

Farm.—Dig main crop potatoes. Push on with ploughing and sowing of cereal crops, and peas and beans. Green fodder (as for April) may still be sown. Land for maize, potatoes, and other root crops should be prepared and manured. Flax may be sown. Transplant Chou Moellier and Giant Drumhead cabbage plants in rows 3 feet apart. Complete sowing permanent pastures with grasses and clovers.

Orchard.—Plough, manure; apply lime to orchard lands at rate or 5 or 10 cwt. per acre where soil is sour. Spray trees infested with scale insects, Woolly Aphis, and Bryobia Mite with red oil or crude petroleum. Clean all rough bark from trees. Commence pruning early varieties at end of month. Pick up and boil all fallen fruit.

Flower Garden.—Digging, manuring, and pruning; trench and drain where necessary. Dress the surface with lime. Continue to sow hardy annuals. Bury all leaves, soft-wood cuttings, and weeds. Continue to plant spring blooming perennials and other plants. Plant cuttings of carnations and roses.

Vegetable Garden.—Cut down and clean out asparagus beds. Apply manure and lime dressings. Cultivate deeply. Plant out seedlings and early potatoes; sow peas, broad beans, carrots, and parsnips.

Vineyard.—Subsoil land for new plantations if not already done. This work should be carried out as long before planting as practicable. Vine-growers are warned against the too common practice of feeding off foliage after vintage. Any small advantage in the form of stock feed is only gained at the cost of a reduction in the following season's crop, owing to interference with accumulation of reserves which continues so long as the leaves remain green. Sheep, or other animals, should not be allowed into the vineyard until the leaves have changed colour. Early and deep ploughing is strongly recommended. Manures should be applied as early as possible. Peas, &c., for green manuring, should be sown without delay, in order to take advantage of early rains.

Cellars.—Rack or fill up (preferably the former) dry wines as soon as a lighted match, introduced at bung hole, is no longer extinguished. Sweet wines should also be racked and fortified to full strength.

BEE-KEEPING.

May is the last month during which bees may be examined, handled, and, if necessary, fed without risk of endangering the existence of the colonies or seriously interfering with their safe wintering. Supers (upper stories) should be removed and stored indoors in a dry place, care being taken that bee moths cannot get access to the combs. Where suitable storage room is not available indoors, the boxes of spare combs may be left outside, but should be placed underneath the box containing the cluster of bees and the entrance to the hive contracted to one-third or fourth of the summer width.

Small colonies should be reduced to one set of combs in a single story, and any combs not covered by bees are best removed if the amount of stores is insufficient and has to be supplemented by feeding sugar syrup. The amount of honey or sugar syrup necessary to carry bees safely through the winter varies according to the strength of the colony, the locality, and the earlier or later flowering of the spring flora of the district. It is therefore not possible to state what the amount should be; it may, however, be laid down as a general rule that the combs which the bees cover at this time of the year should be at least more than half-full of sealed honey or sugar syrup. When sugar syrup has to be fed to supplement the stores it should be of the density of ripe honey, or approximately two (by weight) to one of water. The simplest way of making syrup is to pour the measured quantity of dry sugar into the correct amount of boiling water, keeping it on the stove and stirrring it till dissolved. The syrup should be given blood warm in a simplicity or frame feeder inside the hive.

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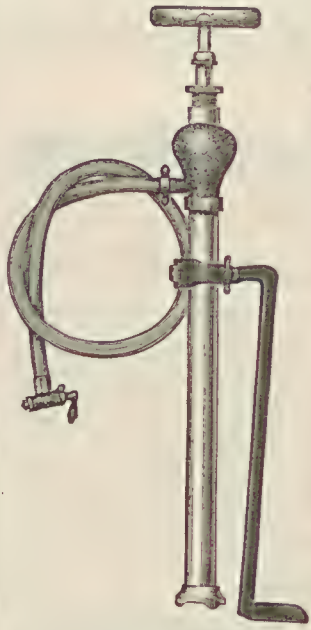

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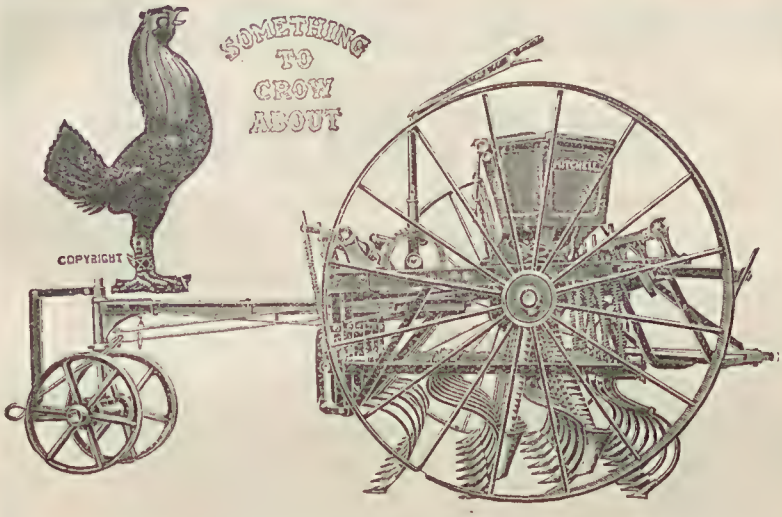

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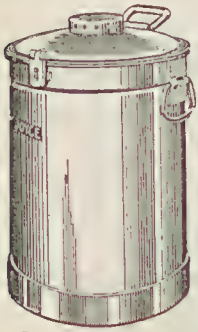

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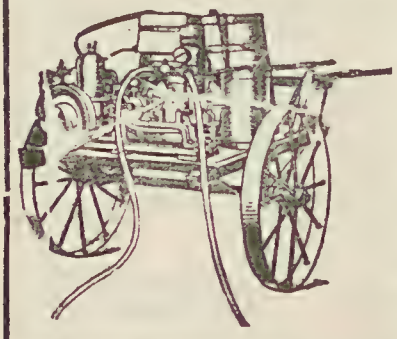

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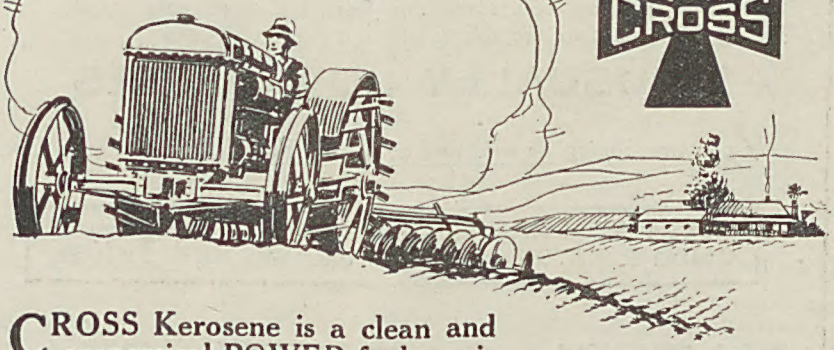

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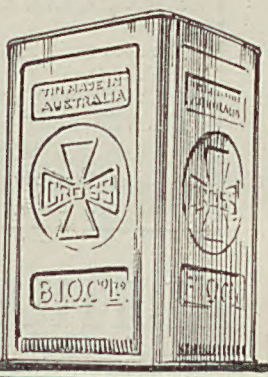

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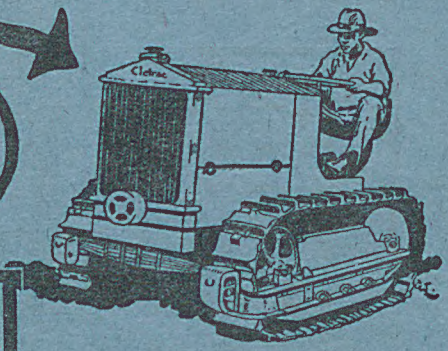

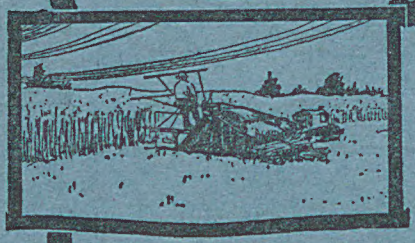

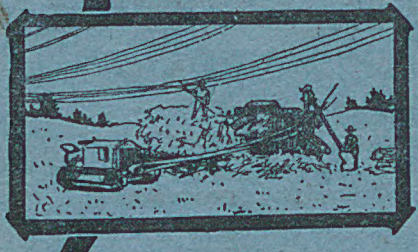

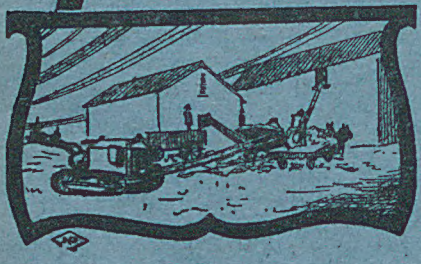

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